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### 1. Application

This specification will be applied to the department that produces ODD.  
**Write**(DVD±R/±R DL/±RW,CD-R/RW,and DVD-RAM),  
**Read**(DVD-ROM(SL,DL)/±R/±R DL/±RW,CD-ROM/CD-R/RW,DVD-RAM,

### 2. Test Related Standard

Reliability Test Standard (DOQR-0002K)

### 3. Definition of Terms

- A. **Interface** : Connect signal between ODD (Optical Disc Drive) and COMPUTER (HOST).
- B. **USB** : Universal Serial Bus Interface
- C. **ACCESS TIME** : time to find & read data.( RANDOM, 1/3 STROKE, FULL STROKE)
- D. **TRANSFER RATE** : The rate at which data is transferred from DRIVE to COMPUTER in some amount of BYTE per SECOND.
- E. **SPINDLE MOTOR** : A MOTOR that rotates the DISC to spin.
- F. **SLED MOTOR** : A MOTOR that transports the optical P/U.
- G. **PICK-UP (or P/U)** : An optical HEAD that reads and writes the DATA from or at the DISC.
- H. **LEAD-IN Time** (Loading Time, Start up Time): A time from completion of TRAY CLOSE to completion of TOC READ.
- I. **EJECT Time** (Unloading Time, Stop Time): A time consumed from inputting EJECT KEY till the TRAY is OPEN.
- J. **Mastered CD** : CD that is mass-produced by Press method.
- K. **CD-R/DVD±R/±R DL** : A DISC that can write the DATA for only once.
- L. **CD-RW/DVD±RW/DVD-RAM**: A DISC that can write the DATA for several times (OVERWRITE) DISC.

### 4. Type of Product

Read/Write --> 7.MAIN Specification D.TRANSFER RATE / BASIC FUNCTION

### 5. Voltage Consumption

+5V DC ± 5%

※ the maximum speed depends on the writing media condition or some of user's PC environment/specifications.

### 6. Structure

#### A. FRONT

- 1) LOADING TYPE: Tray Load Type
- 2) TACT SWITCH: LOAD/EJECT.
- 3) Emergency EJECTS Hole (Drawer Emergency Open Hole)

#### B. REAR

Mini USB2.0 (B Type)

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## 7. MAIN SPECIFICATION

**A. DISC DIAMETER:** 8cm/12cm

### B. APPLIED DISC & DATA FORMAT

#### 1) DISC TYPE

READ: MASTERED DISC, CD-R, CD-RW,  
 DVD-ROM, DVD+R 4.7GB, DVD+R DL 8.5GB, DVD+RW 4.7GB,  
 DVD-R 3.95GB, DVD-R 4.7GB Authoring, DVD-R 4.7GB General, DVD-R DL 8.5GB  
 DVD-RW, DVD-RAM 4.7GB  
 WRITE: DVD4.7GB (DVD±R/RW, DVD-RAM), DVD±R DL(8.5GB), CD-R/RW

#### 2) DATA FORMAT:

CD: CD-DA, CD-ROM, MIXED-CD, CD-ROM XA, ENHANCED-CD, CD-EXTRA/CD+,  
 Photo-CD, VIDEO-CD, CD-TEXT, CD-G, Multi-Session  
 DVD: DVD-RAM, DVD-ROM, DVD-VIDEO, Multi-Session(Read/Write), Multi-  
 Border(Read/Write)

#### 3) WRITE METHOD :

CD-R/RW: DAO, TAO, SAO, Packet Write(RW)  
 DVD+R/RW: Sequential, Random(RW)  
 DVD-R/RW: Incremental, DAO, Restricted Overwrite(RW)  
 DVD-RAM: Random

### C. DATA CAPABILITY

- MODE 1, DVD : 2048 BYTE/SECTOR.
- MODE 2 : 2336 BYTE/SECTOR.

### D. TRANSFER RATE

TRANSFER METHOD		TYPE	TRANSFER RATE	REMARKS
READ	Sustained Transfer Rate	DVD-ROM (Single)	Max 10,800 KB/s	8x CAV (TDV-520,STD-2000)
		DVD-ROM (Dual)	Max 10,800 KB/s	8x CAV (STD-1100, STD-WN)
		DVD±R (4.7GB)	Max 10,800 KB/s	8X CAV
		DVD±R DL (4.7GB)	Max 10,800 KB/s	8X CAV
		DVD±RW (4.7GB)	Max 10,800 KB/s	8X CAV
		DVD-RAM (4.7GB)	Max 6,750 KB/s	5X PCAV (5X 미디어 기준)
		CD-ROM/R/RW	Max 3,600 KB/s	24x CAV (STD-200,STD-200 Copy)
	CD-DA PLAY CD-DA DAE	Max 1,500 KB/s Max 3,600 KB/s	10X CAV 24X CAV	
Burst	SATA (GEN1)	Max 145 MB/sec		

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	Transfer Rate	PIO MODE 4,DMA MODE2 UDMA MODE2	MAX 16.6MB/sec MAX 33.2MB/sec	
WRITE	Sustained Transfer Rate	DVD+R(4.7GB)	Max 10,800 KB/s	8X PCAV
		DVD+R DL(8.5GB)	Max 8,100 KB/s	6X ZCLV/6X PCAV
		DVD+RW(4.7GB)	Max 10,800 KB/s	8X ZCLV
		DVD-R(4.7GB)	Max 10,800 KB/s	8X PCAV
		DVD-R DL(8.5GB)	Max 8,100 KB/s	6X ZCLV/6X PCAV
		DVD-RW(4.7GB)	Max 8,100 KB/s	6X ZCLV
		DVD-RAM(4.7GB)	Max 6,750 KB/s	5X PCAV
		CD-R	Max 3,600 KB/s	24X PCAV
		CD-RW (Standard Speed)	Max 600 KB/s	4X CLV
		CD-RW (High Speed)	Max 1,500 KB/s	10X CLV
CD-RW (Ultra Speed)	Max 3,600 KB/s	24X ZCLV		

**E. BUFFER SIZE : 1 MB**

**F. POWER CONSUMPTION**

ITEM	CONDITION	SPECIFICATION			REMARKS
		TYP	MAX	UNIT	
Power Consumption	Sleep	.02	.03	A	LASER / MOTOR Off (Slumber mode)
	Standby	.04	.05	A	LASER / MOTOR Off (Slumber mode)
	Idle	.5	.6	A	LASER/MOTOR On, CD base
	Active (Average)	.8	1.30	A	100% RANDOM ACCESS
	Active (Peak)	1.30		A	2ms under

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### G. MECHANICAL & ELECTRICAL SPECIFICATION

NO	ITEM	CONDITION	SPECIFICATION			REMARKS	
			R&D (TYP)	MP (MAX)	Unit		
1	SPIN-UP TIME (PAUSE → MAX)	CD: STD-200	6	8	sec	Stop -> MAX	
		DVD: TDV-520	6	8	sec		
2	SPIN-DOWN TIME (MAX → STOP)	CD	6	7	sec	STD-200, TDV-520, STD-1100	
		DVD	6	7	sec		
3	Spin Down & Eject	CD, DVD	5	5.5	sec		
4	Lead-in Time (Include DOS, Windows environment)  In close, icon activation time and multi session add 0.5 sec per session.	CD STAMP, CD-DA	18	21	sec	STD-200, excluding 8cm, fashion disc	
		CD-R/RW	18	21	sec	excluding 8cm, fashion disc	
		DVD-ROM	18	21	sec	TDV-520/STD-NH, Including 8cm	
		DVD-ROM DUAL	21	24	sec	STD-1100/STD-WN, Including 8cm	
		DVD±R/RW	25	28	sec	Including 8cm	
		DVD±R DL	25	31	sec	Including 8cm	
		DVD-RAM	45	60	sec		
5	Access Time  * 1000times  <u>*Apply only for room temp/humidity, High temp and low temp will have different condition.</u>	CD-ROM/R/RW	RANDOM	140	190	ms	150~314850 (STD-200/STD-200 Copy)
			1/3 Stroke	200	220	ms	68500~157485 (STD-200/STD-200 Copy)
			Full Stroke	320	350	ms	150~314850 (STD-200/STD-200 Copy)
		DVD-ROM SL	RANDOM	160	190	ms	150~2200000 (STD-NH/TDV-520/STD-1300)
			1/3 Stroke	200	220	ms	540000~1200000 (TDV-520/STD-NH/STD-1300)
			Full Stroke	300	350	ms	150~2200000 (STD-NH/TDV-520/STD-13000)
		DVD-ROM DL (OTP)	RANDOM	200	230	ms	150~4040000 (STD-1100/STD-WN)
			1/3 Stroke	220	250	ms	540000~1200000 (STD-1100/STD-WN) 540000~2820000 (STD-1100/STD-WN)
			Full Stroke	350	400	ms	150~2024500 (STD-1100/STD-WN)
		DVD±R/RW	RANDOM	190	220	ms	150~2200000 (TDV-520 Copy/STD-NH py)
			1/3 Stroke	220	250	ms	540000~1200000 (TDV-520/STD-NH Copy)
			Full Stroke	350	400	ms	150~2200000 (TDV-520/STD-NH Copy)
		DVD±R DL	RANDOM	200	230	ms	150~4040000
			1/3 Stroke	220	250	ms	540000~1200000

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				240	280	ms	540000~2820000		
			Full Stroke	350	400	ms	150~2024500		
		DVD-RAM	RANDOM	250	350	ms	150~2200000(Full Write Media)		
			1/3 Stroke	350	400	ms	540000~1200000(TDV-520/STD-NH/STD-1300)		
		Full Stroke	500	550	ms	150~2200000(Full Write Media)			
6	Develop ERROR RATE	CD - MODE 1		$< 10^{-12}$		After error correction and verification			
		CD - DA		$< 10^{-9}$		After error correction			
		DVD-ROM/±R/±RW		$< 10^{-12}$		After error correction			
		DVD-RAM		$< 10^{-12}$		After error correction			
	Process ERROR RATE	CD-R/RW		200	0	6 Error rate (C1: 200, C2: 0)			
		DVD±R/RW		280	20	Blank disc (PI: 100, PO: 5)			
			700	40	Dow (PI: 700, PO: 40)				
7	SEEK ERROR RATE		CD & DVD	$< 10^{-6}$		Seek duty ratio of 10% or less Under standard operating conditions with retries			
8	CPU UTILIZATION		CD & DVD	80	85	%	PIO Mode4		
9	CD/DVD Playability	Interruption	CD	1	0.8	mm	TCD-725B		
		Black Dot	CD / DVD	1	0.8	mm	TCD-725B / TDV-525		
		Scratch	CD / DVD	1	0.8	mm	TCD-721R / TDV-521		
		Finger Print	CD / DVD	75	65	μm	TCD-725 / TDV-525		
		Eccentric	CD Stamp	210	140	μm	TCD-713		
			CD-R/RW	140	70	μm	TCD-713		
			DVD	150	100	μm	TDV-512		
		CD/DVD	280		μm	NOT SUPPORT			
10	CD/DVD Readability	Black Dot	CD /DVD	1.0	0.8	mm	SCD-2945		
		Scratch	CD /DVD	1.0	0.8	mm	SCD-2946, TDV-521/TDV-R521CW		
		Finger Print	CD /DVD	75	65	μm	SCD-2945,TDV-525/TDV-R525CW		
		Eccentric	CD	140	70	μm	140um → 20x, 210 → 16x 280um → 10x SCD-2941,2942		
			DVD	150	100	μm	100um->8x, 150um ->6x TDV-512/TDV-R512CW		

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		Deviation	CD/DVD	280		$\mu\text{m}$	NOT SUPPORT
			CD	1.0	0.8	mm	No speed down, SCD-4651,2940
			DVD	0.8	0.6	mm	No speed down, TDV-532/TDV-532CW

※ In case of some abnormal discs(ex. Eccentric, Unbalance & Deviation disc) which used to cause transfer rate down, they have additional 200msec(full access: 300msec) at seek time and 8sec at Lead-in time specification, unless any fail occurs.

※ In case of deviation(over 1.0mm) discs it allows speed down because of drive's vibration.

※ DVD±RW Eccentric 150um disc will have write speed-down, unless any fail occurs.  
(DVD+RW CLV 2.4X, DVD-RW CLV 2X)

Note: Smart Power read and write specs is separated.

#### H. READ/WRITE SPEED ACCORDING TO MEDIA AND MODE

ITEM	FORMAT	CLASS	DISC TYPE	SPEED	SPEED UP/DOWN
CD READ	.CD-DA	AUDIO PLAY		CAV 10X	10
		DAE		CAV 24	24/20/16/10
	.VIDEO-CD .CD-G .CD-I .CD-TEXT  .CD-ROM .MIXED-CD .ENHANCED-CD .CD-EXTRA/+ .PHOTO CD	Data	12cm (STAMP, CD-R/RW) 8cm (STAMP, CD-R/RW), 명함 CD	CAV 16X	16/10
			12cm : STAMP/CD-R/RW: 8cm (STAMP, CD-R/RW), 명함 CD	Max CAV 24X Max CAV 16X	24/20/16/10 16/10
DVD READ	DVD	DATA	STAMP-SINGLE/DUAL	CAV 8X	8/6/4/2
			DVD±R/RW	CAV 8X	8/6/4
			DVD±R DL	CAV 8X	8/6/4
			DVD-RAM	PCAV 5X	5/3/2
		VIDEO	STAMP-S/D, DVD±R/R DL/RW, DVD-RAM	CAV 4X	4
CD WRITE	DAO: CD-R/RW SAO: CD-R/RW TAO: CD-R/RW		CD-R: 12cm	PCAV 24X	24/20/16/10
			CD-R: 8cm, Card CD	CLV 4X	-
	Fixed Packet: CD-RW  Variable Packet: CD-R		CD-RW(Normal): 12cm, 8cm, Card CD	CLV 4X	-
			CD-RW(HS): 12cm,	CLV 10X	10/4

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DVD WRITE	CD-MRW: Optional	8cm, Card CD		
		CD-RW(USRW+): 12cm	ZCLV 24X	24/20/16/10
		DVD+R :12cm	PCAV 8X	8/6/3.3/2.4
	Random, Sequential, Multi-Session: DVD+R/RW,DL DVD+MRW: Optional	DVD+R :8cm	CLV 3.3x	-
		DVD+RW	ZCLV 8X	8/6/4/2.4
		DVD+R DL	ZCLV 6X	6/4/3.3
	DAO, Incremental, Multi-Border: DVD-R/RW Restricted-Overwrite: RW	DVD-R : 12Cm	PCAV 8X	8/6/3.3/2
		DVD-R : 8cm	CLV 2x	-
		DVD-RW	ZCLV 6X	6/4/2
		DVD-R DL	ZCLV 6X	6/4/3.3
	DVD-RAM	DVD-RAM	PCAV 5X	5/3/2

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**I. DEFAULT MODE SPEED**

Default MODE	LEAD IN	CD	CAV 16X	
		DVD	CAV 4X	
	PAUSE	CD	CAV 16X	
		DVD	CAV 4X	
	IDLE	CD	CAV 16X	
		DVD	CAV 4X	
	ADJUST	CD	CAV 16X	
		DVD	CAV 4X	

**J. CD RECORDED DISC CHARACTERISTIC**

NO	ITEM	CONDITION	SPECIFICATION				REMARKS
			MIN	TYP	MAX	UNIT	
1	I11/Itop=I11R=m11	CD-R	0.6				
		CD-RW	0.55		0.7		
2	I3/Itop=I3R=m3	CD-R	0.3		0.7		
		CD-RW	0.3		0.7		
3	JITTER(3TL,3TP,11TL,11TP)	CD-R/RW			40	ns	DOW(0) TIA Measurement
4	BLER	Average 10 sec			220	EA/sec	

\* MEASURE RECORD DISC WITH CD-CATS

DOW=Direct Over Write

**K. DVD RECORDED DISC CHARACTERISTIC**

NO	ITEM	CONDITION	SPECIFICATION				REMARKS
			MIN	TYP	MAX	UNIT	
1	JITTER	DVD+R			13	%	Data to Data Bottom Jitter
		DVD+RW			13	%	16% at DOW
		DVD-R			13	%	
		DVD-RW			13	%	16% at DOW
		DVD-RAM			13	%	16% at DOW
2	I14/I14H	DVD±R/RW/RAM	0.6				



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3	I3/I14	DVD±R/RW/RAM	0.15				
4	Signal asymmetry	DVD±R/RW/RAM	-0.05		0.15		
5	PI errors in any consecutive 8 ECC blocks	DVD±R/RW/RAM			280	EA	except DVD-RAM

#### L. OPERATION & STORAGE CONDITION

ITEM		MEASURE	REMARKS	
Operating temperature	Operating	0°C to 50°C	when read CD/DVD	
	Operating	5°C to 45°C	when records CD/DVD	
	Storage	-40°C to 65°C	drive preserved condition	
	Temp.Slope	Max .5°C/step	Operating	
Operating humidity	Operating	5 % to 80 %		freeze free
	Storage	5 % to 95 %	drive preserved condition	
Vibration	Operating	1.0Grms 0.7Grms	Direction : Bt,L,R	
	Not operating	3.94Grms 15min.	Direction : Bt,T,L,R,F,Bk 5 ~ 800Hz 15min	
	Operating	2ms 170G half sine (read)	Direction : Bt,L,R,F,Bk	
Impact	Not operating	0.5msec 600G 2msec 400G 10msec 150G	Direction : Bt,T,L,R,F,Bk	

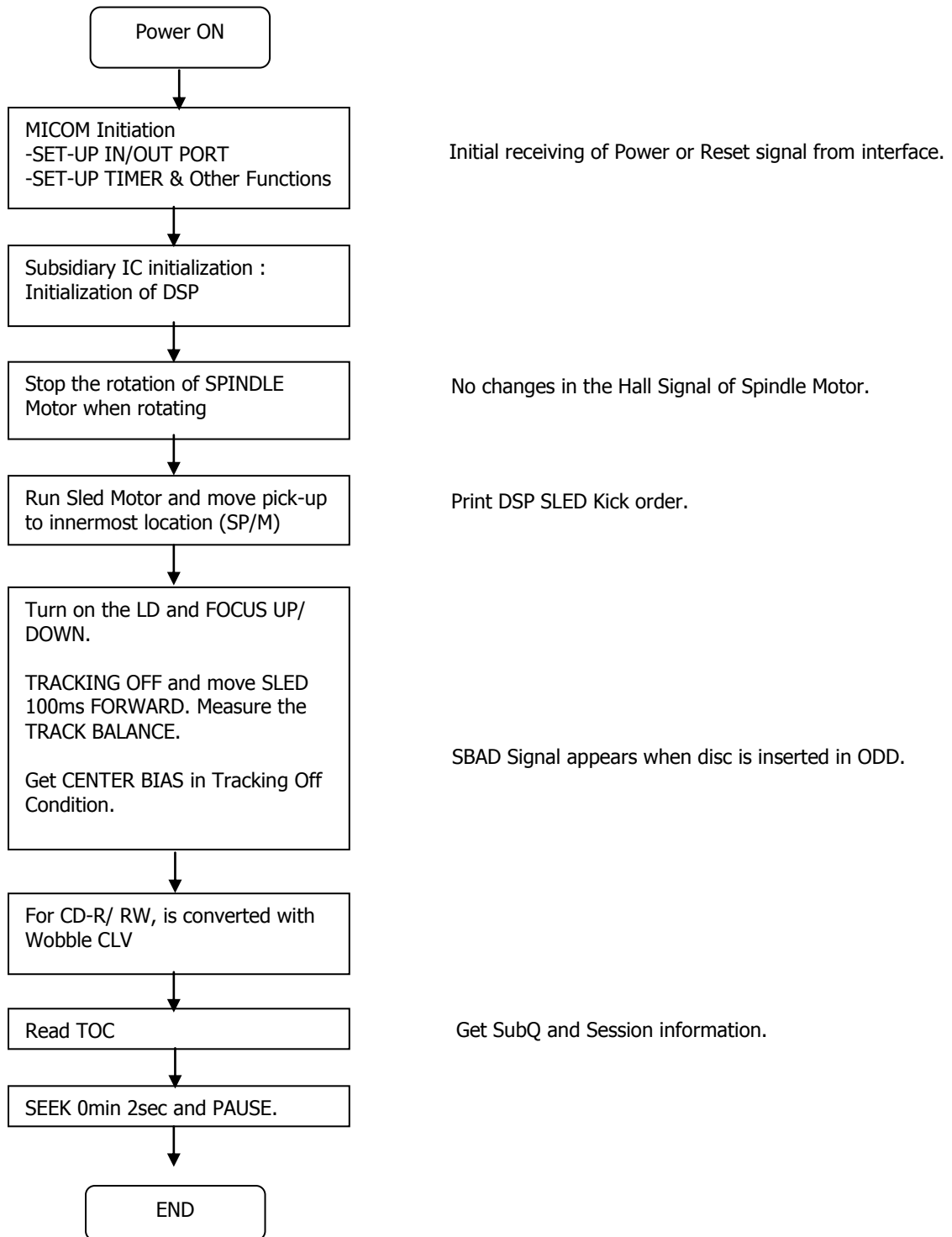
#### M. MAIN LINE PRODUCTION - TRANSFER RATE TEST STANDARD

ITEM		CD-ROM	DVD-ROM (SINGLE)	DVD-ROM (DUAL)
STANDARD DISC	Type	STD-200	TDV-520A	STD-1100
	LBA(100%)	322430	2273280	1945290
MEASUREMENT LOCATION	LBA (Dec.)	100%	100%	50%
	SPEC (KB/sec)	3600 (typ.) 3400 (min.)	10800(typ.) 10200(min.)	10800 (typ.) 10200 (min.)

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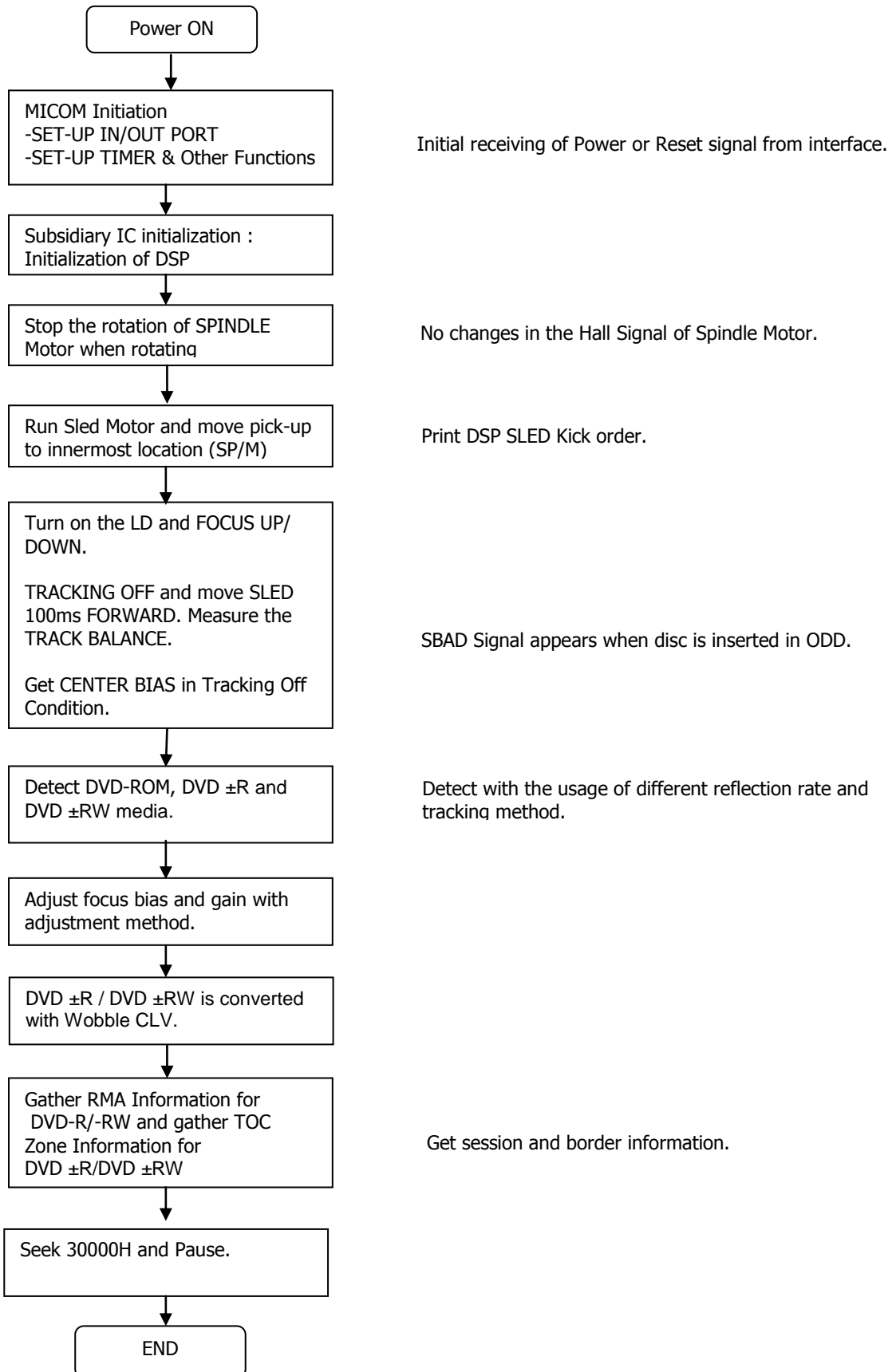
**8. MICOM INITIALIZATION PROCESS**

**A. CD FLOW**



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**B. DVD FLOW**



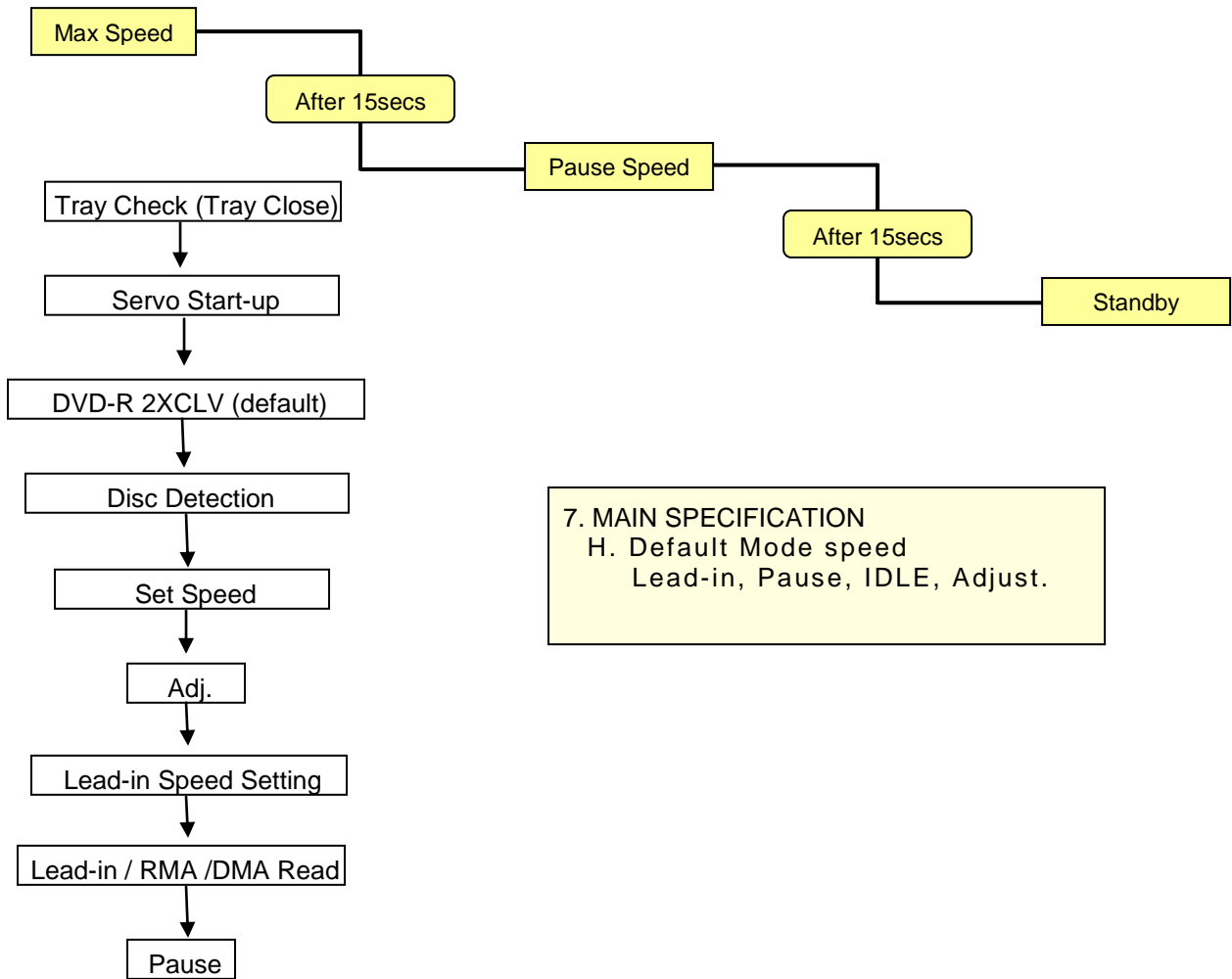
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**9. MASS ECCENTRICITY DISC PROCESSING METHOD.**

Media	Unbalance (gcm)	Speed	Transfer rate (Kb/s)	Media	Unbalance (gcm)	Speed	Transfer rate (Kb/s)
CD-ROM CD-R	0.3	24x	3,600	CD-RW	0.3	24x	3,600
	0.5	10x	1,500		0.5	10x	1,500
DVD Single	0.3	8x	10,800	DVD Dual DVD ±R DVD ±RW	0.3	8x	10,800
	0.5	4x	5,400		0.5	4x	5,400

\* Expecting Optimization during Development.  
(Changes can be applied due to MP Fluctuation).

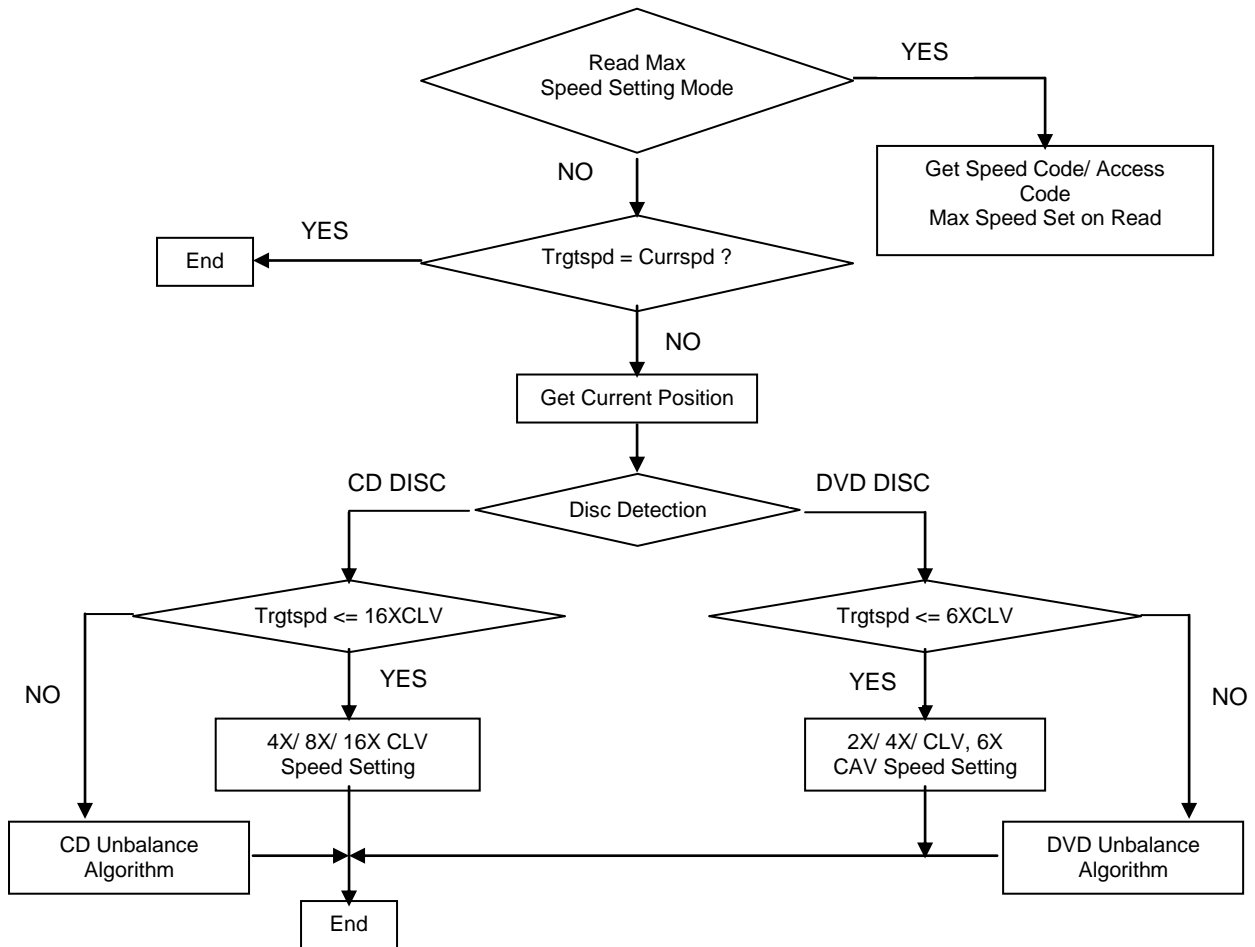
**10. POWER MANAGEMENT SYSTEM**



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**11. SPEED CHANGE IN CASE OF EMERGENCY**

**A. Speed setting function**



**B. Speed Down Condition**

Speed Down Condition (OR)

- ① Seek Failure  
Seek Retry Overflow occurs (Seek Retry Limit: 15 times)
- ② Buffering Failure  
Read Retry Overflow occurs (Read Retry Limit: 15 times)

**C. Speed Up Condition**

Speed Up Condition

- ① 10 sec from the point where Speed Down started.

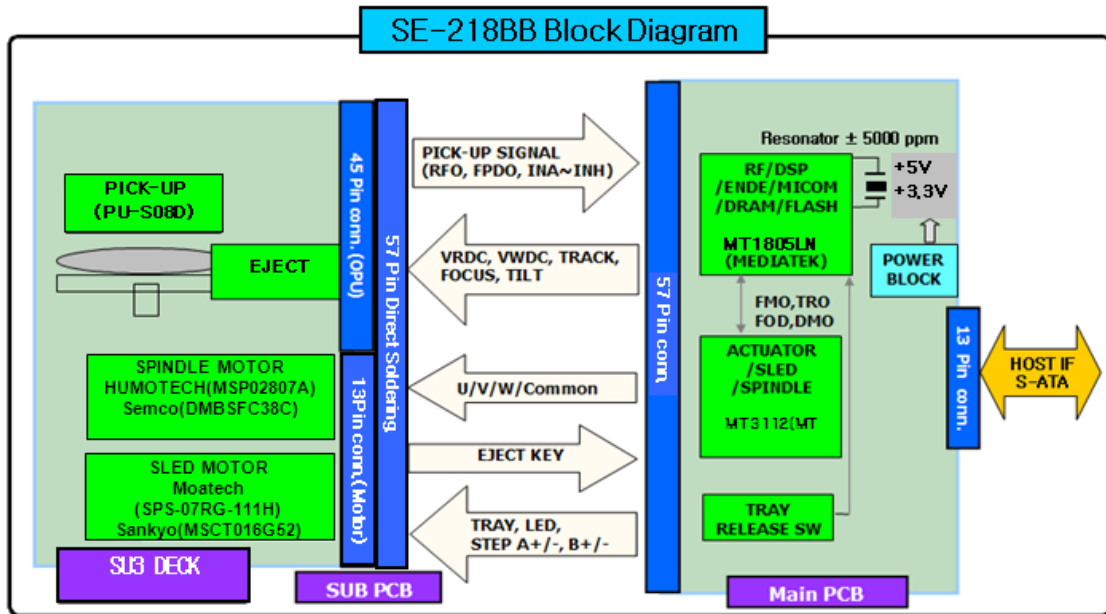
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## 12. MECHANICAL SPECIFICATION

1. MECHANICAL			
Item	SPEC	REMARKS	
Appearance	148mm(W) x 14mm(H) x 143mm(D)	WITHOUT BEZEL	
Weight	270g under (net)	Including optical system / WITHOUT BEZEL	
SPINDLE MOTOR	DMBSFC38CH	SEMCO	
	MSP02807A	HUMOTECH	
STEP MOTOR	SPS-07RG-111H	MOATECH	
	MSCT016G52	SANKYO	
SOLENOID	DL0915S3-011-5	SHINMEI	
	MSD5S-01A	MOATECH	
2. SPINDLE PART			
ITEM	SPEC	REMARKS	
TURN - TABLE HEIGHT	4.85±0.05 mm	Upper BRACKET~DISC assembly side	
TURN - TABLE RUN-OUT	30um↓		
CENTERING RUN-OUT	75um↓		
DISC SLIPPING TORQUE	15 mN·m min.	φ15.1, 0.8t Disc	
DISC INSERTING FORCE	11 N MAX.	φ15.0, 1.2t Disc	
DISC PULL-OUT FORCE	3~6 N	φ15.0, 1.2t Disc	
THRUST FORCE	1.8~3.5 N min.	PULL SPEED : 10 mm/min	
3. SLED PART			
ITEM	SPEC	REMARKS	
Following Mode ( PWM control )	5.0 V		
SEEK Mode ( PWM control )	5.0 V		
STEP MOTOR	RATED VOLTAGE	DC 4.0 V	
	PHASE	2 PHASES	
	STEP ANGLE	22.5 DEGREE	
	PITCH	2.0 mm	
PICK - UP boundary	Optimum inner position	< R 21.7 mm	T/ TABLE Center ~ OL Center
	Optimum outer position	> R 58.7 mm	T/ TABLE Center ~ OL Center
SLED RESOLUTION	125 μm		
STEP MOTOR frequency	1600 PPS		

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13. Block Diagram



14. AV CONNECTIVITY

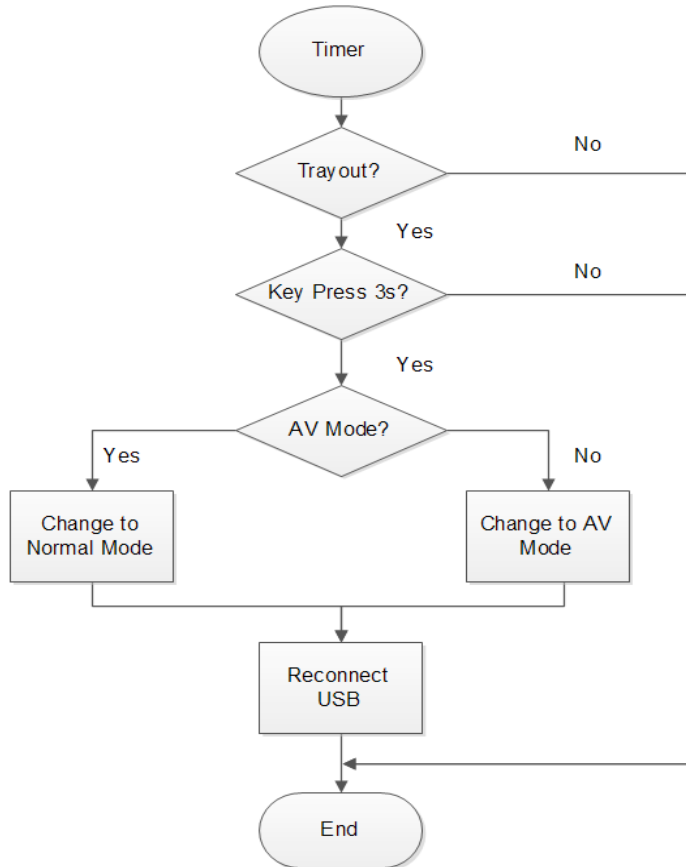
14.1 AV Connectivity Features

Spec	SE-218BB
IS09660	Support
UDF 1.02	Support
UDF 2.50	All UDF 2.5 discs (include AVCHD)
VCD	Read file name and play file (Host should support MPEG play)
CD Audio	Read file name and play file (Host should support WAV file play)
Directory Depth	5 Levels
Total Directory/ File number	Maximum of 3000 Files

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**14.2 AV Connectivity Mode Switching**

**AV mode switch flow**



- In RW mode, U-drive switch to AV mode, when key Press time is over 3 second and drive is tray out.
- In AV mode, U-drive switch to RW mode, when key Press time is over 3 second and drive is tray out.

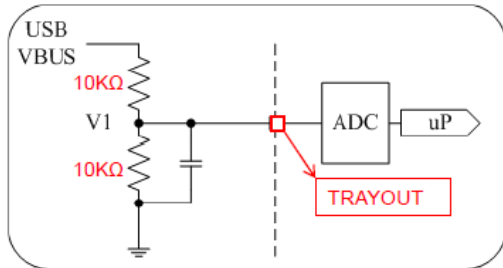


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**15. SMART POWER**

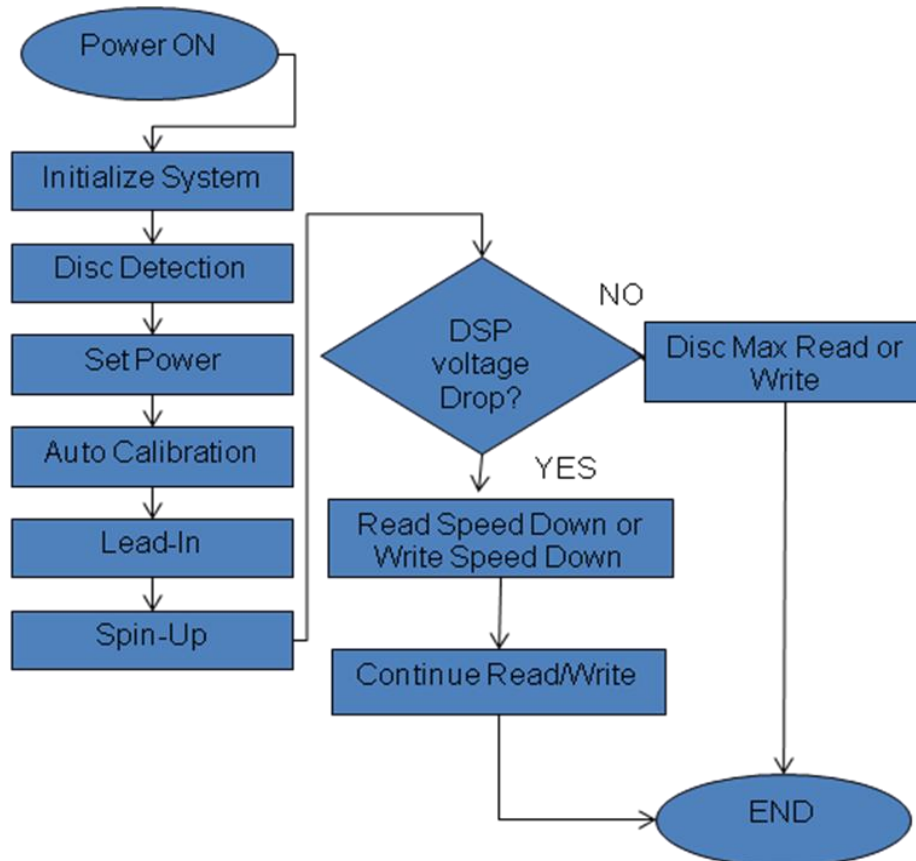
Smart power application is for voltage drop detection for external models.

FW Definition : VBUS\_AD\_DETECT



- In order to apply 1 port USB in external models, we need first to consider the possibility of decrease in power supply. As an action for this we will add VBUS divider circuit that will divide 5V to 2.5V and we will define VBUS\_AD\_Detect in the firmware.
- As for the function of VBUS\_AD\_Detect, in case the supplied power is at minimum the drive should read speed down or write speed down to avoid read fail of write fail.

**15.1 Smart Power F/W flow**



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### 15.1 Smart Power Read and Write Specs According to Media

Transfer Method	MEDIA TYPE	Normal Maximum Speed	Smart Power Speed
READ	DVD-ROM Single	8X CAV	4X CAV
	DVD-ROM Dual	8X CAV	4X CAV
	DVD±R (4.7GB)	8X CAV	4X CAV
	DVD±R DL (8.5GB)	8X CAV	4X CAV
	DVD±RW (4.7GB)	8X CAV	4X CAV
	DVD-RAM (4.7GB)	5X PAV	2X PAV
	CD-ROM/R/RW	24X CAV	16X CAV
	CD-DA Play	10X CAV	10X CAV
	CD-DA DAE	24X CAV	16X CAV
WRITE	DVD+R (4.7GB)	8X PAV	4XZCLV
	DVD+R DL (8.5GB)	6X PAV	4XZCLV
	DVD+RW (4.7GB)	8X ZCLV	3X CLV
	DVD-R (4.7GB)	8X PAV	4XZCLV
	DVD-R DL (8.5GB)	6X PAV	4XZCLV
	DVD-RW (4.7GB)	6X ZCLV	3X CLV
	DVD-RAM (4.7GB)	5X PAV	2X CLV
	CD-R	24X PAV	16X PAV
	CD-RW (Standard Speed)	4X CLV	4X CLV
	CD-RW (High Speed)	10X CLV	10X CLV
	CD-RW (Ultra Speed)	24X ZCLV	10X CLV

### 16. Product Clocking Information

	Frequency (MHz)	If clock embedded in chip, state chip.	Remarks
Flash clock	48.2Mhz	MT1805LN	
DRAM clock	37.5Mhz	MT1805LN	
Resonator clock	25Mhz	N.A.	<i>Add in additional rows if there several crystal, and state crystal destination, e.g. X1 or X2</i>
PATA/SATA clock	750Mhz	N.A.	
Others:			
OPU	Frequency (MHz)	Tolerance (+- MHz)	Remarks
CD HFM	350	50	
DVD HFM	300	50	
CD EFM	4.3218* recording speed		
DVD EFM	26.16*recording speed		
USB	240Mhz		

Title	SE-218BB Product Specifications	REG. No	REV No	PAGE
		EBRS-0204E	01	20

**17. CAUTION**

- A. To install and connect the product, make sure that there is no power supply.  
Keep away from direct ray of the sun, heating machines.  
Avoid humid, dusty, and extremely cold places.  
Place it on a flat solid bottom in a well ventilated area.
- B. Read the manual before using the product  
Follow the instructions written in the manual.  
Do not disassemble or operate the product voluntarily.