Travelstar 2LP
DSOA-20810 and DSOA-21080

The latest 2.5” disk drives from IBM provide up to 1080MB in a slim 12.5mm high package. Using the latest MR head technology, IBM’s patented No-ID™ sector formatting, the S.M.A.R.T. function and advanced power saving modes, IBM provides high performance,high capacity drives, particularly suited to the mobile computing market, and its increasing application of multimedia.

DSOA-21080

Applications

- High performance portable computers
- Non-IT – process control/fax
- Removable/secure storage units

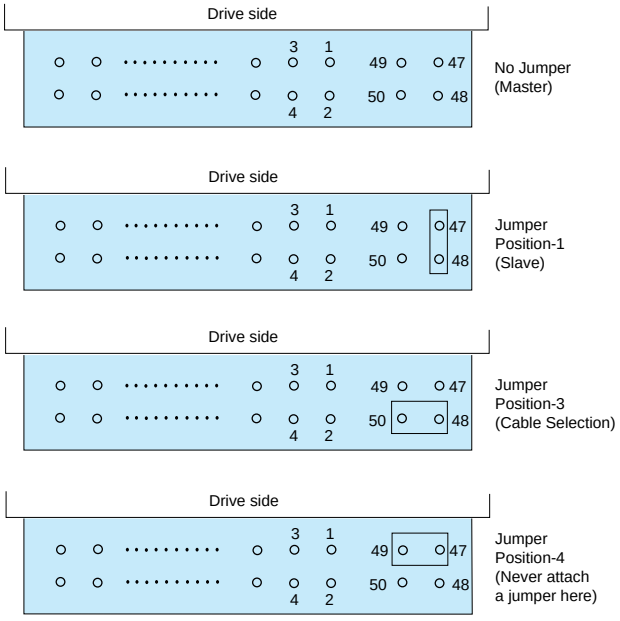
Features	*Benefits*
• *810/1080MB at (512 bytes/sector)*	• *Highest capacity in 2.5” form factor*
• *Enhanced IDE interface with DMA data transfer* *– Single word: mode 2 (8.3MB/sec)* *– Multi word: mode 2 (16.6MB/sec)* • *PIO data transfer – mode 4 (16.6MB/sec)*	• *Popular interface with excellent performance*
• *Shock 500G (2ms) non-operational* • *Shock 100G (2ms) operational*	• *Robust design for portable computing applications*
• *Media data rate 33.6/59.9 Mbits/s (8 zones)* • *Rotational speed 4009rpm* • *Average seek 13 milliseconds (Read)*	• *Excellent data rate across disk surface*
• *Magneto resistive heads*	• *High areal density, low component count*
• *No-ID™ sector formatting*	• *More data stored per track, increased sustained data transfer rate*
• *96KB segmented buffer with write cache* • *Enhanced ECC on the fly*	• *Fast access to data and improved throughput*
• *Advanced power saving modes (0.85 watt at idle state)*	• *Low power for battery powered applications*
• *Spin up 2.3 sec (typical)*	• *Fast recovery from standby*
• *S.M.A.R.T. function*	• *Protection of user data*
• *MTBF 300,000 hours*	• *Assured reliability*

Electrical Connector Locations

Drive Address

A jumper cable is available at the interface connector to determine the drive address.

Using Cable Selection, the drive address depends on the condition of pin 28 of the AT interface cable. In the case when pin 28 is ground or low, the drive is a Master. If pin 28 is open or high level, the drive is a Slave.

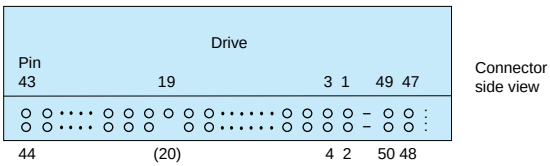


Cabling

The maximum cable length from the host system to the HDD plus circuit pattern in the host system shall not exceed 18 inches.

AT Signal Connector

The AT signal connector is designed to mate with Dupont part number 69764-044 or equivalent.



Notes:

1. Pin position 20 is left blank for secure connector insertion.
2. Pin 47: When grounded, No-Spin-up at POR when open/pull up, Normal Spin-up at POR.

Data Organisation

DSOA	20810	21080
Head Number	16	16
Sectors/Track	63	63
Cylinder Number	1575	2100
Sector Size	512	512
Total Customer Usable Data Sectors	1,587,600	2,116,800
Total Customer Usable Data Bytes	810MB	1080MB

DC Power Requirements

Nominal Supply	+ 5 volts
Power Supply Ripple (0-20Mhz)[1]	100mv p-p max
Tolerance[2]	±5%
Supply Current	Pop. Mean (Nominal Condition)
Idle average[3]	< 0.17A RMS Max (0.85W)
Read/Write	< 0.46A RMS Max (2.3W)
Seek average[4]	< 0.46A RMS Max (2.3W)
Standby	< 0.06A RMS Max (0.3W)
Sleep	< 0.02A RMS Max (0.1W)
Start up (maximum peak)[5]	< 0.94A RMS Max (4.7W)
(average from power on to ready)[6]	< 0.70A RMS Max (3.5W)
Supply Rise Time	7-100 ms

Notes:

1 The maximum supply ripple is measured at 5V input of the HDD.

2 The disk drive shall not incur damage for an over voltage condition of +25% (maximum duration of 20 ms) on the 5 volt nominal supply.

3 The Idle current is specified at inner track.

4 The read/write current is specified based on three operations of 63 sector read/write per 100 msec.

5 The seek average current is specified based on three operations per 100 msec.

6 The worst case operating current includes motor surge.

PACKAGING: The drive must be protected against Electro-Static Discharge especially when being handled. The safest way to avoid damage is to put the drive in an anti static bag before ESD wrist straps etc are removed.

Drives should only be shipped in approved containers, severe damage can be caused to the drive if the packaging does not adequately protect against the shock levels induced when a box is dropped. Consult your IBM marketing representative if you do not have an approved shipping container.

Signal Definition

The pin assignments of interface signals are listed as follows:

PIN	Signal	I/O	PIN	Signal	I/O
01	–HRESET	I	02	GND	
03	HD07	I/O	04	HD08	I/O
05	HD06	I/O	06	HD09	I/O
07	HD05	I/O	08	HD10	I/O
09	HD04	I/O	10	HD11	I/O
11	HD03	I/O	12	HD12	I/O
13	HD02	I/O	14	HD13	I/O
15	HD01	I/O	16	HD14	I/O
17	HD00	I/O	18	HD15	I/O
19	GND		(20)	Key	
21	DMARQ	O	22	GND	
23	–HIOW	I	24	GND	
25	–HIOR	I	26	GND	
27	HIORDY	O	28	CSEL	I
29	–DMACK	I	30	GND	
31	HIRQ	O	32	–HIOCS16	O
33	HA01	I	34	–PDIAG	I/O
35	HA00	I	36	HA02	I
37	–HCSO	I	38	–HCS1	I
39	–DASP	I/O	40	GND	
41	+5V Logic	PWR	42	+5V Motor	PWR
43	GND		44	(Resv)	

Note:
“O” designates an output from the drive.
“I” designates an input to the drive.
“I/O” designates an input/output common.
“PWR” designates a power supply to the drive.
“(Resv)” designates reserved pins which must be left unconnected.

Note: There are two input pins for +5 Volt power supply, “+5V LOGIC” and “+5V MOTOR”. “+5V LOGIC” is connected to the internal logic circuits and “+5V MOTOR” is connected to the spindle motor and motor driver.

It is possible to turn on and off “+5V LOGIC” by an external switch circuit to reduce power consumption to the least possible. In this mode, a voltage drop out due to the motor spin up current can be reduced by connecting “+5V MOTOR” line into the system power source directly.

If the above power management option is used, all signal lines that will be electrically active in the host system while the HDD is disconnected from power line shall be isolated by Three-State line drivers. Internal leakage through ESD protection circuit may pull down LPUL (Least Positive Up Level) of logic signal below specification.

Use both lines in parallel, for regular HDD applications.

Command Description

The following Commands are supported by the drive:

Commands	(Hex)	
Protocol		
Check Power Mode	(E5)	3
Check Power Mode*	(98)	3
Disable Password	(F6)	2+
Erase Prepare	(F3)	3+
Erase Unit	(F4)	2+
Executive Device Diagnostic	(90)	3
Format Track	(50)	2
Freeze Lock	(F5)	3+
Identify Device	(EC)	1
Identify Device DMA	(EE)	4
Idle	(E3)	3
Idle*	(97)	3
Idle Immediate	(E1)	3
Idle Immediate*	(95)	3
Initialize Device Parameters	(91)	3
Read Buffer	(E4)	1
Read DMA (retry)	(C8)	4
Read DMA (no retry)	(C9)	4
Read Long (retry)	(22)	1
Read Long (no retry)	(23)	1
Read Multiple	(C4)	1
Read Native Max LBA/CYL	(F8)	3+
Read Sectors (retry)	(20)	1
Read Sectors (no retry)	(21)	1
Read Verify Sectors (retry)	(40)	3
Read Verify Sectors (no retry)	(41)	3
Recalibrate	(1X)	3
Seek	(7X)	3
Set Features	(EF)	3
Set Max LBA/CYL	(F9)	3+
Set Multiple Mode	(C6)	3
Set Password	(F1)	2+
Sleep	(E6)	3
Sleep*	(99)	3
SMART Disable Operations	(B0)	3
SMART Enable/Disable Attribute Autosave	(B0)	3
SMART Enable Operations	(B0)	3
SMART Execute Off – line Data Collection	(B0)	3
SMART Read Attribute Values	(B0)	1
SMART Read Attribute Thresholds	(B0)	1
SMART Return Status	(B0)	3
SMART Save Attribute Values	(B0)	3
SMART Write Attribute Thresholds	(B0)	2
Standby	(E2)	3
Standby*	(96)	3

Standby Immediate	(E0)	3
Standby Immediate*	(94)	3
Unlock	(F2)	2+
Write Buffer	(E8)	2
Write DMA (retry)	(CA)	4
Write DMA (no retry)	(CB)	4
Write Long (retry)	(32)	2
Write Long (no retry)	(33)	2
Write Multiple	(C5)	2
Write Sectors (retry)	(30)	2
Write Sectors (no retry)	(31)	2
Write Verify	(3C)	2

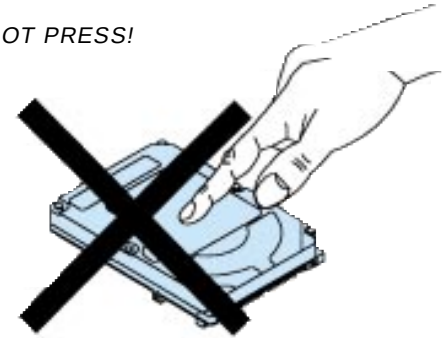
Protocol:

1 : PIO data IN command
2 : PIO data OUT command
3 : Non data command
4 : DMA command
+ : Vendor specific command

Alternate Command codes for previous defined commands.

Caution

DO NOT PRESS!



- *Do not press when you take out the drive.*
- *Do not press when you carry the drive.*
- *Attach the drive free from pressing force.*

Warning: This disk drive can be damaged by Electro-Static Discharge, please follow recommended ESD procedures before unpacking or handling the drive. Ask your Dealer for details if you need assistance.

Operating Modes

Description

Spin-Up
Start up time period from spindle stop or power down.

Seek
Seek operation mode.

Write
Write operation mode.

Read
Read operation mode.

Active
The device is capable of responding immediately to media access requests, and commands complete execution in the shortest possible time.

Idle
The device is capable of responding immediately to media access requests. Some circuitry including servo system and R/W electronics are in power saving mode. A device in Idle mode may take longer to complete the execution of a command because it has to activate the circuitry

Standby
The device interface is capable of accepting commands. Spindle motor is stopped. All circuitry except host interface are in power saving mode. The execution of commands is delayed until spindle becomes ready.

Sleep
The device requires a soft reset or hard reset to be activated. All electronics including spindle motor and host interface are shut off.

Note:
Upon power down or Spindle stopped, a head locking mechanism will secure the heads in the ID parking position.

Electromagnetic Compatibility

The drive meets the following EMC requirements when installed in a host system and exercised with a random accessing routine at maximum data rate:

United States Federal Communication Commission (FCC) Rules and Regulations Part 15, Subject J – Computer Devices “Class B Limits”.

European Economic Community (EEC) directive #76/889 related to the control of radio frequency interference and the Verband Deutscher Elektrotechniker (VDE) requirements of Germany (GOP).

Operating Environment

Humidity:

Operating	8% to 90%
Relative	non-condensing
Non-Operating	5% to 95%
Relative	non-condensing

Wet Bulb Temperature:

Maximum Wet Bulb:

Operating	29.4°C non-condensing
Non-Operating	40°C non-condensing

Elevation:

Operating Altitude	– 300 to 3000m
Ship/Storage Altitude	– 300 to 12000m

Temperature:

Operating	5° to 55°C*
Storage	0° to 65°C
Shipping	– 40° to 65°C
Temperature Gradient (Operating, storage & shipping)	20°C per hour (maximum)

* Note:
The system is responsible for providing sufficient air movement to maintain surface temperature below 60°C at the centre of top cover of file.

Air Cooling Requirement
The host system must provide sufficient air flow across the drive to maintain the temperature at less than 60°C (measured at the centre of the files' top cover).

Operating Shock
The drive will withstand (with no hard error) a 100G half-sine wave shock pulse of 2ms duration.

Non-Operating Shock
The drive will withstand (with no permanent damage or degradation in performance) a 120G half-sine wave shock pulse of 11ms duration or 500G for 2ms.

Operating and non-Operating Vibration
Due to the complexity of this subject we recommend that users contact the Distributor to discuss how to perform the necessary measurements if they believe this to be an area which requires evaluation.

Power Management Feature

The power management feature set permits a host to modify the behaviour of a manner which reduces the power required to operate. The power management feature set provides a set of commands and a timer that enables a device to implement low power consumption modes.

DSOA-2XXXX implement the following set of functions.

1 A Standby timer
2 Idle command
3 Idle Immediate command
4 Sleep command
5 Standby command
6 Standby Immediate command

Power Mode
The lowest power consumption when the device is powered on occurs in Sleep Mode. When in sleep mode, the device requires a reset to be activated. The time to respond could be as long as the power on reset time.

In Standby Mode the device interface is capable of accepting commands, but as the media may not immediately accessible, there is a delay while waiting for the spindle to reach operating speed.

In Idle Mode the device is capable of responding immediately to media access requests.

In Active Mode the device is under executing a command or accessing the disk media with read look - ahead function or write cache function.

Note: For further details see drive specification.

S.M.A.R.T. Function

The intent of self - monitoring, analysis and reporting technology (S.M.A.R.T.) is to protect user data and prevent unscheduled system downtime that may be caused by predictable degradation and/or fault of the device. By monitoring and storing critical performance and calibration parameters, S.M.A.R.T. devices employ sophisticated data analysis algorithms to predict the likelihood of near - term degradation or fault condition. By alerting the host system of a negative reliability status condition, the host system can warn the user of the impending risk of data loss and advise the user of appropriate action.

Since S.M.A.R.T. utilizes the internal device microprocessor and other devices resources, there may be some small overhead associated with its operation. However, special care has been taken in the design of the S.M.A.R.T. algorithms to minimize the impact to host system performance. Actual impact of S.M.A.R.T. overhead is dependant on the specific device design and the usage patterns of the host system. To further ensure minimal impact to the user, S.M.A.R.T. capable devices are shipped from the device manufacturer's factory with the S.M.A.R.T. feature disabled. S.M.A.R.T. capable devices can be enabled by the system OEMs at time of system integration or in the field by aftermarket products.

Note: For further details see drive specification.

Mechanical Data

Dimensions	DSOA-20810/21080
Height (mm)	12.7
Width (mm)	69.85
Length (mm)	100.2
Weight (gram)	140/140 Max

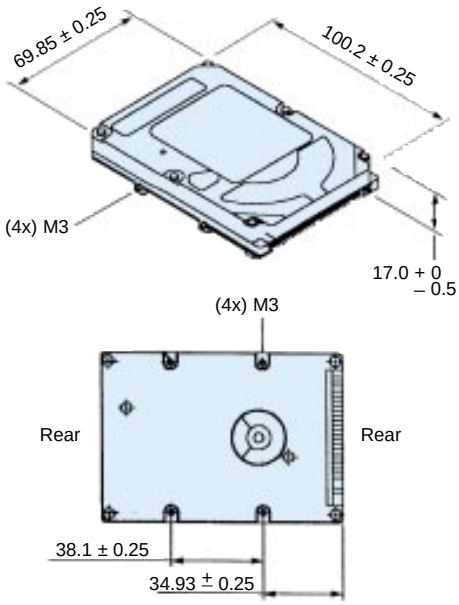
Mounting Orientation

The drive will operate in all axes (6 directions). The drive will operate within the specified error rates when tilted ±5 degrees from these positions.

Performance and error rate will stay within specification limits if the drive is operated in the other permissible orientations from which it was formatted. Thus a drive formatted in a horizontal orientation will be able to run vertically and vice versa.

The drive must be securely mounted in the system to prevent motion or vibration during a seek operation or spindle rotation using appropriate screws or equivalent mounting hardware.

Vibration and shock tests are to be conducted with the drive mounted to the equipment using the bottom four screw holes.



The recommended mounting screw torque is 3 ± 0.5 kgf.cm.

The recommended mounting screw depth is 3.5 ± 0.5mm for bottom and 5.0 ± 0.5mm for horizontal mounting.

IBM OEM Europe
PO Box 6
Langstone Road
Havant
Hampshire
PO9 1SA
United Kingdom
Telephone: (44) 1705 486363

Registered in England: No. 741598
Registered Office: PO Box 41, North Harbour, Portsmouth, Hampshire PO6 3AU.

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