

IBM OEM STORAGE PRODUCTS

Deskstar DALA-3540

IBM OEM has introduced a new disk drive for the desktop personal computer marketplace. Available at the 540MB capacity point with AT interface, the drive provides excellent performance and improved reliability.

Applications

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- * Desktop personal computers

| Features | Benefits |
|---|---|
| * 528, or 541MB formatted capacity (512 byte/sector), chosen by jumper. | * Generic popular storage capacity. |
| * PIO data transfer - mode 3 (max 11.1 Mb/s). | * Fast interface data rate. |
| * 48.7 Mb/s (OD) media data rate. * 32.2 Mb/s (ID) media data rate. | * Excellent performance on long records. |
| * Average seek time 12ms (Read). * 4500 RPM. | * Fast access to data. |
| * 96 KB three segment sector buffer. * Read ahead caching with LFU (Least frequently used) segment update. | * Fast data retrieval in multi-tasking applications. |
| * Industry standard mounting. * The drive can be mounted with any of its six surfaces facing down. | * Ease of installation. |
| * Advanced ECC on the fly. | * Improved data throughput. |
| * CHS and LBA addressing modes. | * Flexibility to support most appropriate addressing. |
| * Power saving modes. | * Reduced power consumption. * Ideal for energy-efficient systems. |
| * Robust design for EMC/RFI. | * Easy integration across multiple platforms. |
| * MR (Magneto Resistive) head technology. | * High area density, low component count. |
| * No-ID(TM) sector format. | * More data stored per track, increased sustained data transfer rate. |
| * MTBF 350,000 hours. | * Assured reliability. |

Shipping Default Settings
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MASTER is set to on (ie jumper on pins 1-2), 541MB capacity set. No other jumpers are fitted.

Note:

The jumper positions JP1, JP2, JP3 must not be selected concurrently.

Operating Environment
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Operating Conditions

| | |
|------------------------------|-------------------------------|
| Temperature | 5 to 55 degrees C* |
| Relative Humidity | 8 to 90% non-condensing |
| Maximum Wet Bulb Temperature | 29.4 degrees C non-condensing |
| Maximum Temperature Gradient | 15 degrees C/Hour |
| Altitude | -300 to 3000m |

Non-Operating Conditions

| | |
|------------------------------|---|
| Temperature | -40 to 65 degrees C (shipping) 0 to 65 degrees C (storage) |
| Relative Humidity | 5 to 95% non-condensing |
| Maximum Wet Bulb Temperature | 35 degrees C non-condensing |
| Altitude | -300 to 12,000m |

Note *:

The system is responsible to provide sufficient air movement to maintain surface temperature below 60 degrees C at the center of top cover of the drive.

Operating shock

The hard disk drive meets the following criteria while operating in respective conditions described below. The shock test consists of ten shocks inputs in each axis and direction for total of 60. There must be a delay between shock pulses, long enough to allow the drive to complete all necessary error recovery procedure.

No errors

5 G, 11ms half-sine shock pulse.

No data loss, seek errors or permanent damage

10 G, 11ms half-sine shock pulse.

No data loss or permanent damage

 15 G, 5ms half-sine shock pulse.
 30 G, 4ms half-sine shock pulse.

Operating Vibration

Due to the complexity of this subject, we recommend that users contact the IBM technical support group representative to discuss how to perform the necessary measurements if they believe this to be an area which requires evaluation.

Data Organization

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| Logical Layout | DALA | DALA |
|------------------------------------|-----------|--------------|
| | -3540 | -3540 |
| Jumper 7 | attached | not attached |
| Number of Heads | 16 | 16 |
| Number of Sectors/Track | 63 | 63 |
| Number of Cylinders | 1049 | 1024 |
| Sector Size | 512 | 512 |
| Total Customer Usable Data Sectors | 1,057,392 | 1,032,192 |
| Total Customer Usable Data Bytes | 541MB | 528MB |

DC Power Requirements

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The following voltage specifications apply at the drive power connector. Damage to the drive electronics may result if the power supply cable is connected or disconnected while power is being applied to the drive (No hot plug/unplug is allowed). There are inductive loads in the drive which could cause destructively high voltage spikes on the drive if the power connection is opened. There is no special power on/off sequencing required.

| | | |
|---|-----------|-----------|
| Nominal Supply Voltages | +5 Volts | +12 Volts |
| Maximum Ripple (0-10 MHz) | 100mV p-p | 150mV p-p |
| Voltage Supply Tolerance (incl. ripple) | +/-5% | +10%/-8% |
| Power Supply Current (Amps) | +5 Volts | +12 Volts |
| Start peak | 0.50 | 0.52 |
| Idle average | 0.18 | 0.14 |
| R/W average | 0.49 | 0.17 |

During the drive start up and seeking, 12 volt ripple is generated by the drive (referred to as dynamic load-ing). If several drives have their power daisy chained together, then the power supply ripple plus other drive's dynamic loading must remain within the regulation tolerance of +10/-8%. A common supply with separate power leads to each drive is a more desirable method of power distribution.

To prevent external electrical noise from interfering with the drive's performance, the drive must be held by four screws in a user system frame which has no electrical level deference at the four screws position, and has less than +/-300 millivolts peak to peak level deference to the drive power connector ground.

Signal Definition

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The pin assignments of interface signals are listed as follows:

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=====
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
-----
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
-----

```

Note:

"O" designates an output from the Drive.

"I" designates an input to the Drive.

"I/O" designates an input/output common.

Cabling

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The maximum cable length from the Host system to the drive, plus the

circuit pattern length inside the Host systems, must not exceed 18 inches (45.7 cm).

Interface
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This data sheet describes some aspects of the host interface to ATA-2 drives. The interface conforms to the working draft of Information Technology-AT Attachment Interface with Extensions (ATA-2) with certain limitations described below.

Automatic Power Down Sequence

A hard reset will disable the automatic power down sequence.

Format Track

A drive will not perform a physical format. Instead, it will simply write a data pattern of all zeros to the sectors which have been specified by the Format Track command.

Format Track Interleave Factor

The drive only supports an interleave factor of 1:1, and may ignore any other specified interleave, without returning an error.

Write long

Write long command should be executed for the same sector after Read long command execution. Otherwise, unexpected ECC correctable error may occur, because of the limitation of the emulation technique to support 4 byte ECC mode which is implemented in the drive.

Seek Overlap

The drive will wait for the seek to complete before interrupting the host. Therefore, no seek overlap can occur. This will be transparent to the host except that performance may be degraded in certain environments where the host could perform other work while waiting for seek complete, such as multi-tasking operating systems.

Sleep mode

During Sleep mode the drive will be activated by any command, including, but not limited to, a soft reset.

Drive/Head Register

Bits 5 and 7 of Drive/Head Register are not written to 0. (These 2 bits are always read as '1' even after host writes to '0'...).

Sleep/Standby/Idle Mode

When entering sleep, standby or idle mode as a result of a command, the busy bit in the status register will remain set until the transition to the new state is complete.

The following Commands are supported by the Drive:

| Commands | (HEX) |
|--------------------------------|-------|
| ----- | ----- |
| Check Power Mode | (E5) |
| Execute Drive Diagnostics | (90) |
| Format Track | (50) |
| Identify Drive | (EC) |
| Idle | (E3) |
| Idle Immediate | (E1) |
| Initialize Drive Parameters | (91) |
| Read Buffer | (E4) |
| Read DMA (retry) | (C8) |
| Read DMA (no retry) | (C9) |
| Read Long (retry) | (22) |
| Read Long (no retry) | (23) |
| Read Multiple | (C4) |
| Read Sectors (retry) | (20) |
| Read Sectors (no retry) | (21) |
| Read Verify Sectors (retry) | (40) |
| Read Verify Sectors (no retry) | (41) |
| Recalibrate | (1X) |
| Seek | (7X) |
| Set Features | (EF) |
| Set Multiple | (C6) |
| Sleep | (E6) |
| Standby | (E2) |
| Standby Immediate | (EO) |
| Write Buffer | (E8) |
| Write DMA (retry) | (CA) |
| Write DMA (no retry) | (CB) |
| Write Long (retry) | (32) |
| Write Long (no retry) | (33) |
| Write Multiple | (C5) |
| Write Sectors (retry) | (30) |
| Write Sectors (no retry) | (31) |
| Write Verify | (3C) |

Registers
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| Address | Input Register | Output Register |
|---------|------------------|-----------------|
| ----- | ----- | ----- |
| 1F0h | Data | Data |
| 1F1h | Error | Features |
| 1F2h | Sector Count | Sector Count |
| 1F3h | Sector Number | Sector Number |
| | *LBA bits 0-7 | *LBA bits 0-7 |
| 1F4h | Cylinder Low | Cylinder Low |
| | *LBA bits 8-15 | *LBA bits 8-15 |
| 1F5h | Cylinder High | Cylinder High |
| | *LBA bits 16-23 | *LBA bits 16-23 |
| 1F6h | Drive/Head | Drive/Head |
| | *LBA bits 24-27 | *LBA bits 24-27 |
| 1F7h | Status | Command |
| 3F6h | Alternate Status | Device Control |
| 3F7h | Drive Address | Not Used |

The host uses the register interface to communicate to and from the drive. The registers are accessed through the host port addresses shown.

The host should not read or write any registers when the Status Register

