IBM OEM Storage Products

Deskstar DALS-3540

IBM introduced a disk drive for the desktop personal computer marketplace. It was available at the 540 MB capacity point with SCSI-2 FAST interface, the drive provided excellent performance and improved reliability.

APPLICATIONS

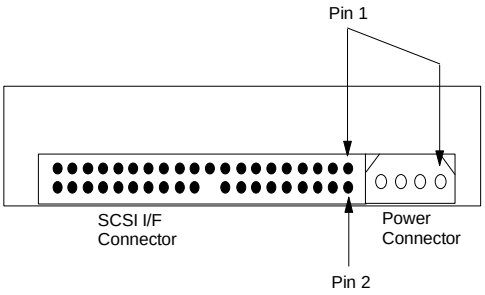
- Desktop personal computers
- Low end workstations
- Storage expansion applications

FEATURES

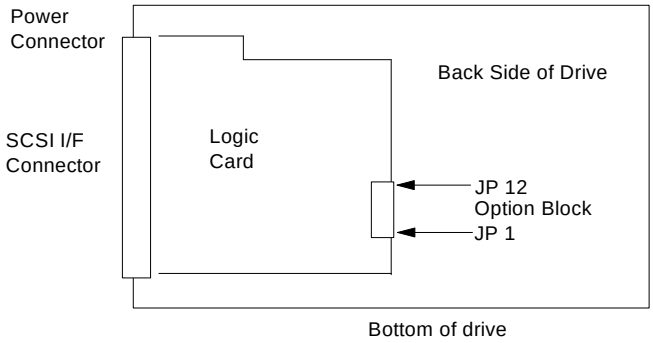
- 541 MB Formatted capacity (512 byte/sector)
- 10 MB/s data transfer speed
- 48.7 Mb/s (OD) media data rate
- 32.2 Mb/s (ID) media data rate
- Average seek time 12 ms (read)
- 4500 RPM
- 64 KB segmented buffer
- Read ahead caching with LFU (Least frequently used) segment update
- Industry standard mounting
- The drive can be mounted with any of its six surfaces facing down
- Advanced ECC on the fly
- Power saving modes
- Robust design for EMC/RFI
- MR (Magneto Resistive) head technology
- No-ID sector format
- MTBF 350,000 hours

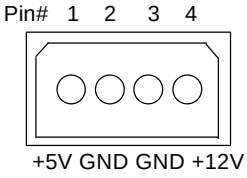
BENEFITS

- Generic popular storage capacity
- Fast interface data rate
- Excellent performance on long records
- Fast access to data
- Ease of installation
- Improved data throughput
- Reduced power consumption
- Ideal for energy-efficient systems
- Easy integration across multiple platforms
- High area density, low component count
- More data stored per track, increased sustained data transfer rate
- Assured reliability

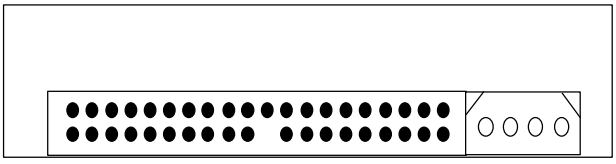


CONNECTORS





The DC power connector is designed to mate with AMP part 1-480424-0 (using AMP pins P/N 350078-4). Equivalent connectors may be used. Pin assignments are shown below, as viewed from the end of the drive.



SCSI SIGNAL CONNECTOR

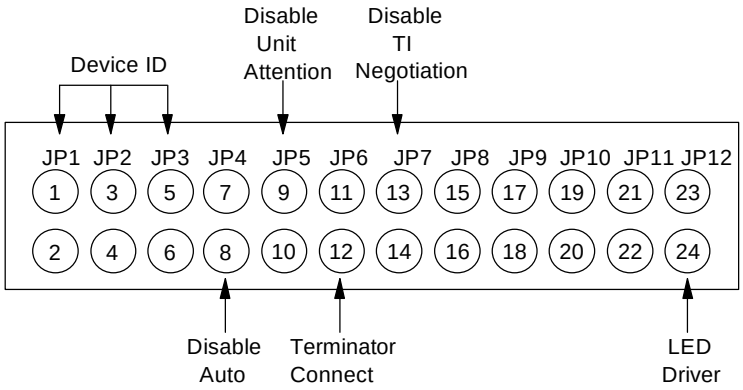
The SCSI Signal Connector is a 50 pin connector meeting the ANSI SCSI specification.

Note: It is intended that the hard disk drive should only be in electrical contact with the chassis of the PC at a designated set of mounting holes. Other electrical contact may degrade error rate performance. As a result of this it is recommended that there should be no metal contact to the hard disk drive except at the mounting holes or the side rails into which the mounting holes are tapped.

OPTION BLOCK

Jumper Setting

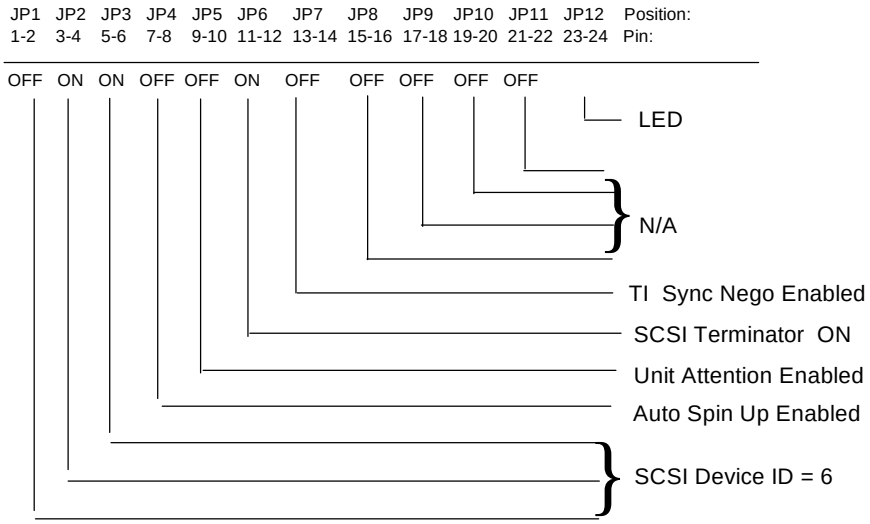
Jumper position and function are as shown below. Pin pitch is 2mm.



The jumpers control SCSI Device ID, Auto Spin Up, Unit Attention, SCSI Terminator Connection, Target Initiated Synchronous Negotiation and the LED Driver Output.

Notes:

1. The jumper position of JP1, 2, and 3 define SCSI ID of the drive
   If JP1,JP2,JP3 are Off,Off,Off the SCSI ID is 0
   If JP1,JP2,JP3 are On,Off,Off the SCSI ID is 1
   If JP1,JP2,JP3 are Off,On,Off the SCSI ID is 2
   If JP1,JP2,JP3 are On,On,Off the SCSI ID is 3
   If JP1,JP2,JP3 are Off,Off,On the SCSI ID is 4
   If JP1,JP2,JP3 are On,Off,On the SCSI ID is 5
   If JP1,JP2,JP3 are Off,On,On the SCSI ID is 6
   (shipping default)
   If JP1,JP2,JP3 are On,On,On the SCSI ID is 7
2. If JP4 is Off, the drive will spin up automatically after power on reset. If JP4 is On, the drive will not spin up unless the host system issues a start command to the drive.
3. If JP5 is On, Unit Attention after power on reset or SCSI bus reset is disabled.
4. If JP6 is On, the internal SCSI active terminator works.
5. If JP7 is On, Target Initiated Synchronous Negotiation is disabled, and then the Initiator is required to start a negotiation handshake if Synchronous SCSI transfers are desired.
6. Jumpers JP8, JP9, JP10 and JP11 are not used.
7. Jumper JP12 can be used to drive a LED for SCSI Busy. Pin 24 is +5V, and Pin 23 will drive a load up to 8mA.



DEFAULT SETTING

The default jumper setting at shipment is as follows:

OPERATING ENVIRONMENT

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 C/Hour
Altitude	-300 to 3048m

Non-Operating Conditions

Temperature	-40 to 65 degrees C
Relative Humidity	5 to 95% non-condensing
Maximum Wet Bulb Temperature	35 degrees C non-condensing
Maximum Temperature Gradient	15 C/Hour
Altitude	-300 to 12,000m

*Note**

The system is responsible to provide sufficient air movement to maintain surface temperature below 60 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 five shocks inputs in each axis and direction for total of 30. There must be a delay between shock pulses, long enough to allow the drive to complete all necessary error recovery procedure.

No errors:
5G, 11 ms half-sine shock pulse
No data loss, seek error or permanent damage:
10G 11 ms half-sine shock pulse
No data loss, or permanent damage:
15 G, 5 ms half-sine shock pulse
30 G, 4 ms 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

Logical Layout	*DALS-3540*
Number of Heads	2
Number of LBAs	1056768
Sector Size	512
Total Customer Usable Data Bytes	541,065,216

DC POWER REQUIREMENTS

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
Power Supply Ripple {mV}(0-10{Mhz}P-P)	100 max	150 max
Voltage Supply Tolerance (incl. ripple)	+/-5%	+10%/-8%
Power Supply Current		
Start up (Peak)	0.51A	1.16A
Idle (average)	0.23A	0.12A
R/W (average)	0.57A	0.14A
Seek (average)	0.41A	0.27A
Standby	0.20	0.01A

During the drive start up and seeking, 12 volt ripple is generated by the drive (referred to as dynamic loading). 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

The pin assignments of interface signals are listed as follows:

PIN	*Signal*	*PIN*	*Signal*
01	Ground	02	-DB(0)
03	Ground	04	-DB(1)
05	Ground	06	-DB(2)
07	Ground	08	-DB(3)
09	Ground	10	-DB(4)
11	Ground	12	-DB(5)
13	Ground	14	-DB(6)
15	Ground	16	-DB(7)
17	Ground	18	-DB(P)
19	Ground	20	Ground
21	Ground	22	Ground
23	Ground	24	Ground
25	Open	26	TRM Power
27	Ground	28	Ground
29	Ground	30	Ground
31	Ground	32	-ATN
33	Ground	34	Ground
35	Ground	36	-BSY
37	Ground	38	ACK
39	Ground	40	-RST
41	Ground	42	-MSG
43	Ground	44	-SEL
45	Ground	46	-C/D
47	Ground	48	REQ
49	Ground	50	-I/O

SCSI CABLE

The disk drive uses single-ended drivers and receivers which will permit cable lengths of up to 6 meters (19.68 feet). For a single ended cable a 50 conductor flat cable or a 25 signal twisted cable can be used with a maximum length of 6.0 meters, and a stub length not exceeding 0.1 meters.

SCSI BUS TERMINATOR

The file has an internal Active SCSI bus terminator, and can be controlled on/off with one jumper block provided at the card edge. The user is responsible for properly terminating and powering the SCSI bus in the system.

MODE SELECT OPTIONS

Certain parameters are alterable using the SCSI 'Mode Select' command. This allows certain drive characteristics to be modified to optimize performance on a particular system. Refer to the DALS-3XXXX Interface Specification for a detailed definition of Mode Select parameters. The changeable parameters are:

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Vendor Unique Parameters

UQE- Untagged Queuing Enable (1)
DWD - Disable Write Disconnect (0)
UAI - Unit Attention Inhibit (0)
ASDPE - Additional Save Data Pointer Enable (0)
CMDAC - Command Activated (LED) (0)
RPFAE - Report Failure Analysis Error (0)
CPE - Concurrent Processing Enable (1)
TCC - Thermal Compensation (0)
DSN Disable Target Initiated Synchronous Negotiation (0)
FRDD Format Degraded (1)
DPSDP - Data Phase Save Data Pointer (0)
CAEN - Command Age Limiter Enable (1)
LITF - Idle Time Function (0)
ADC - Adaptive Cache Enable (1)
QEMC - Queue Error Management Control (0)
DRD - Disable Read Disconnect (1)
LED Not supported (0) Command Aging Limit (48)
DRRT - Disable Read Reassign Target (0)
DNR - Disable Nested Reassigns (1)

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Read-Write Error Recover Parameters

AWRE - Automatic Write Reallocation Enable (1)
ARRE - Automatic Read Reallocation Enable (1)
TB - Transfer Block (0)
PER - Post Error (0)
DTE Disable Transfer on Error (0)
DCR - Disable Correction (0)
Correction Span (0)
Read Retry Count (01h)
Write Retry Count (01h)

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Disconnect/Reconnect Parameters

Read buffer Full Ratio (00h)
Write Buffer Empty Ratio (00h)

Page 7
Verify Error Recovery Parameters
PER (0)
DCR (0)
Verify Retry Count (01h)

Page 8
Caching Parameters
WCE - Write Cache Enable (1)
RCD - Read Cache Disable (0)
MF Multiplication Factor (0)
Disable Pre-Fetch Transfer Length (0)
Minimum Pre-Fetch (0)
Maximum Pre-Fetch (0)
Maximum Pre-Fetch Ceiling (0)
Number of Cache Segments (4)

Page A
Control Mode Page Parameters
Queue Algorithm Modifier (0)
QErr- Queue Error (00h)
DQue - Disable Queing (0)

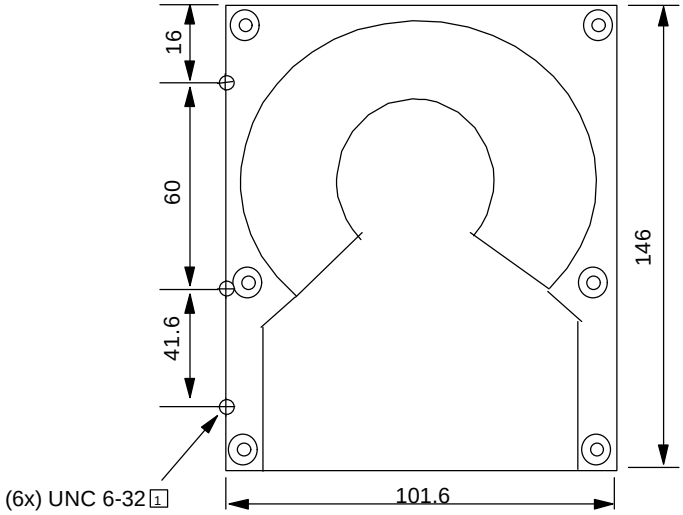
Page 0D
Power Condition
Standby (0)
Standby Timer (00h)

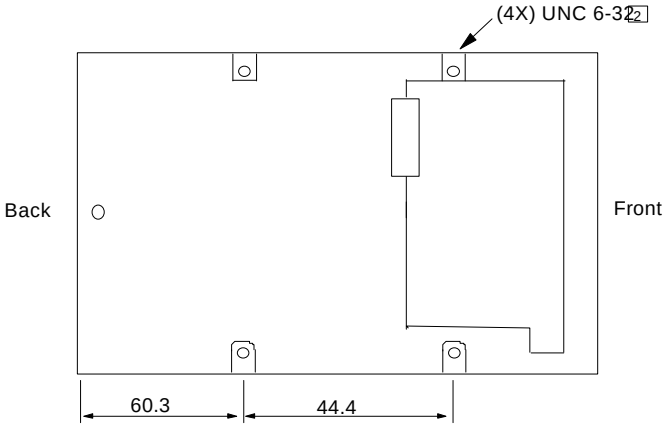
NOTE: (xx) default options at Shipment

Mechanical Data

Dimensions

Height	25.4 +/-0.4 mm
Width	101.6 +/-0.4 mm
Depth	146.0 +/-0.6 mm
Weight	450 g maximum





Mounting Orientation
The drive can be mounted in any axis (6 directions)

The maximum allowable penetration of the mounting screws is (1) 3.5 mm (2) 6 mm The recommended mounting screw torque is 6 to 10 kgF.cm (0.6-1.0 Nm).

ELECTROMAGNETIC COMPATABILITY

The drive meets the following EMC requirements when installed in the user 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).

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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.

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 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.