

# IBM OEM STORAGE PRODUCTS

## DPEA-30540, DPEA-30810 & DPEA-31080

IBM introduced a range of disk drives for the desktop personal computer marketplace. Available in four popular capacity points with AT interface, the drive provided excellent performance and improved reliability.

### *Applications*

- \* Desktop personal computers
- \* Low end file servers

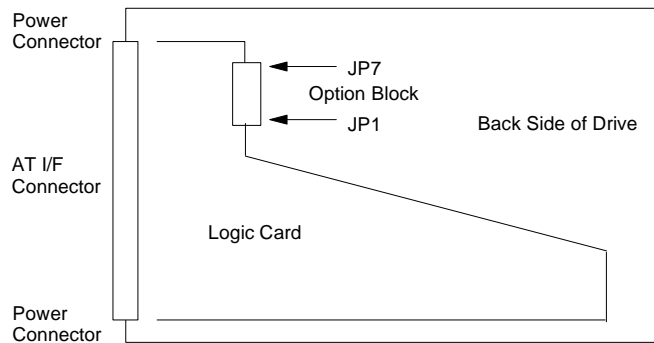
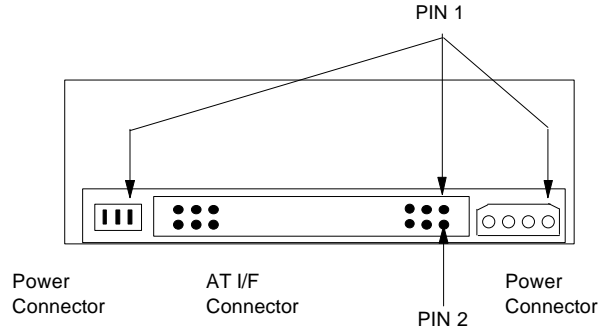
### *Features*

- \* 528, 541, 812 and 1083MB formatted capacity (512 byte/sector)
- \* PIO data transfer - mode 3
- \* DMA data transfer
  - Single word: mode 2 (max 8.3 MB/s)
  - Multiword: mode 1 (max 11.1 MB/s)
- \* Average seek time 10.5ms (Read)
- \* 4500 RPM
- \* 448KB adaptive sector buffer
- \* Read ahead caching of LFU (Least Frequently Used) cache algorithm
- \* Industry standard mounting
- \* The drive can be mounted with any of its six surfaces facing down
- \* Advanced ECC implementation
- \* CHS and LBA addressing modes
- \* Power saving modes
- \* Robust design for EMC/RFI
- \* MR (Magneto Resistive) head count
- \* No sector ID format data
- \* MTBF 350,000 hours

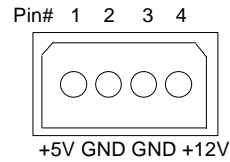
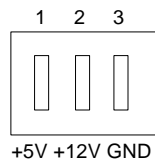
### *Benefits*

- \* Generic range of popular storage capacities
- \* Fast interface data rate (max 11.1 MB/s)
- \* Excellent performance on long records
- \* Fast access to data
- \* Fast data retrieval in single and multi-tasking applications
- \* Ease of installation
- \* Improved data throughput
- \* Flexibility to support most appropriate addressing
  - \* Reduced power consumption
- \* Easy integration across multiple platforms
- \* High area density, low technology component
- \* More data stored per track, increased sustained transfer rate
- \* Assured reliability

## Connectors

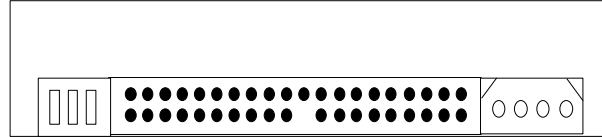


There is a choice of 2 power connections to this drive. One DC power connector is designed to mate with AMP part 1-480424 (using AMP pins P/N 350078-4). The other (3 pin) DC power connector is designed to mate with MOLEX 5480-03 (using MOLEX pins 5479). Equivalent connectors may be used. Pin assignments are shown below, as viewed from the end of the drive.



### ***AT Signal Connector***

The drive uses single-ended drivers and receivers. The connector is designed to mate with 3M part 3417-7000 or equivalent.



*Note:*

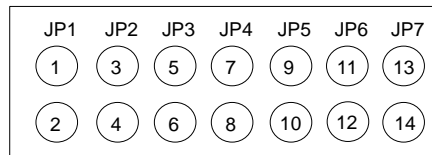
It is intended that the hard disk drive should only be in electrical contact with the chassis of the PC at a designated set of mounting holes. Other electrical contact may degrade error rate performance. As a result of this, it is recommended that there should be no metal contact to the hard disk drive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

### ***Option Block***

#### *Jumper Settings*

Jumpers may be fitted to select the following options:

	Pin Numbers
MASTER active	1-2
SLAVE active	3-4
Cable sel	5-6
Write cache	9-10 (Disabled with jumper)
Auto re-allocation	11-12 (Disabled with jumper)
541/528 MB selection	13-14 (541MB with jumper)



#### *Auto Reallocation Jumper*

Auto reallocation jumper is checked during the initial power on reset (POR) check. Write cache is disabled when a jumper is fitted. (+) Auto reallocation jumper position needs to be OPEN when a user system wants to use write cache.

*Note:*

Auto reallocation only operates, and is mandatory, during write cache operations. Disabling either function by jumper disables both.

### *Write Cache Jumper*

Write cache jumper is checked during the initial POR check.  
Write cache is disabled when a jumper is fitted.

### *528/541MB Selection*

A jumper for JP7 has a meaning only when the model is DPEA-30540. A jumper for the JP7 is used to select 541MB, ie. when the jumper is removed, DPEA-30540 is set to 528MB. This jumper has no meaning for DPEA-30810 and DPEA-31080.

### *Shipping Default Settings*

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*

#### *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
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 drive meets the following criteria:- No data loss, seek errors, or permanent damages within

Read modes within shock pulses of 30G 4ms, or 15G 5ms half-sine wave. The shock pulses of each level are applied to the drive, five pulses in each direction in all three axes. There must be a minimum of a 3 second delay between each shock pulse. The input level is applied to the base plate where the drive is attached with four screws.

### *Non-Operating Shock*

The drive withstands without damage or degradation of performance, a 75G half-sine wave shock pulse of 11ms duration on six sides when heads are parked. (When the power is not applied to the unit, the heads are automatically located on the parked position.) All shock are applied in each direction of the drive three mutually perpendicular axes, one axis at a time. Input levels are measured at the frame of the hard disk drive.

### *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.

### *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	
Maximum Ripple (0-10 MHz)	100mV p-p	150mV p-p	*2
Voltage Supply Tolerance (incl. ripple)	+/-5%	+10%/-8%	*3
Power Supply Current (Amps) (Populated Mean)			
Idle (average)	0.26	0.12/0.16	(A/B *1)
R/W (average)	0.62	0.24/0.28	(A/B *1)
Seek (average)	0.46	0.34/0.37	(A/B *1)
Standby	0.22	0.02	
Start up (peak)	0.64	1.20	

#### *Notes:*

\*1 A/B shows that A is for DPEA-30540 and B is for DPEA-30810 and DPEA-31080.

\*2 The maximum ripple is measured at input of the drive.

\*3 the drive does not incur damage by an over-voltage condition of +25% and the maximum duration of 20msec.

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.

## ***Cabling***

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).

## ***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	

### *Note:*

"O" designates an output from the Drive.

"I" designates an input to the Drive.

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

## ***Interface***

This data sheet describes some aspects of the host interface to ATA drives. The interface conforms to the CAM draft proposal for an AT attachment 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. LBA mode for format track is not supported.

### *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'...).

### ***Data Organization***

<i>Logical Layout</i>	<i>DPEA</i>	<i>DPEA</i>	<i>DPEA</i>	<i>DPEA</i>
	-30540	-30540	-30810	-31080
	<i>(Clipped)</i>			
Number of Heads	16	16	16	16
Number of Sectors/Track	63	63	63	63
Number of Cylinders	1024	1050	1574	2100
Sector Size	512	512	512	512
Sector Number for default CHS	1,032,192	1,058,400	1,586,592	2,116,800
Sector Number for LBA	1,058,496	1,058,496	1,586,664	2,116,992
Usable Bytes for default CHS	528MB	541MB	812MB	1083MB
Usable Bytes for LBA	541MB	541MB	812MB	1083MB

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)

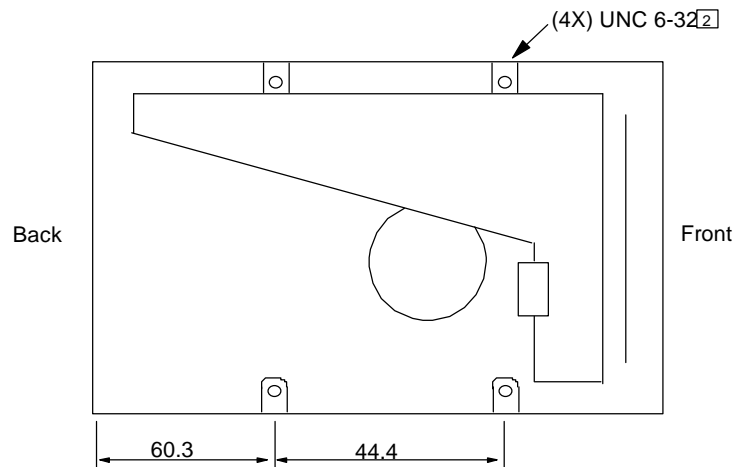
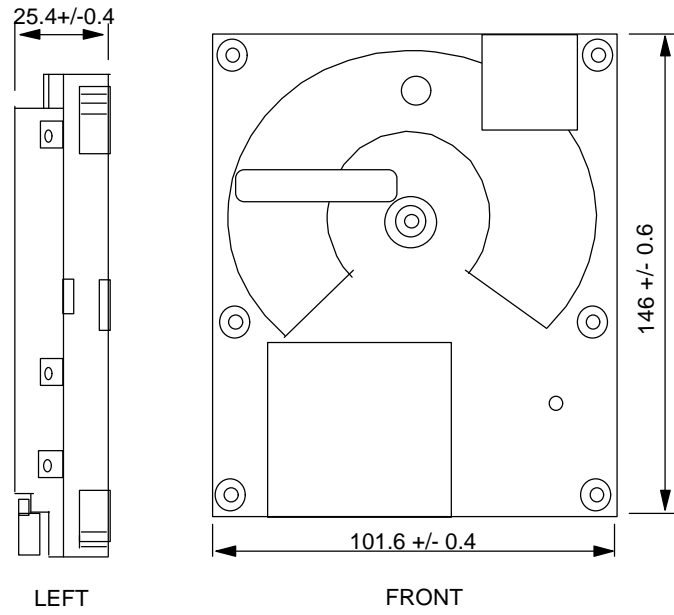
### ***Mechanical Data***

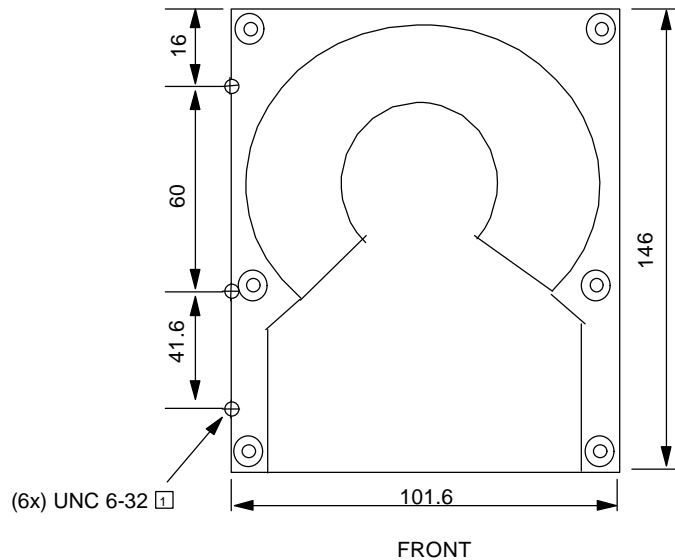
#### *Dimensions*

Height	25.4+/-0.4mm
Width	101.6+/-0.4mm
Depth	146.0+/-0.6mm
Weight	530g maximum

**Mounting Orientation**

The Drive can be mounted in any axis (6 directions).





The maximum allowable penetration of the mounting screws is (\*1) 3.5mm (\*2) 6mm.  
 The recommended mounting screw torque is 3+/-0.5[KgF.cm]

### Registers

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 BSY bit = 1.

### Note:

\* Meaning of Register contents when LBA addressing mode used.

### ***Electromagnetic Compatibility***

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).

**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 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.

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