IBM OEM S torage Products

Ultrastar 9ES
DDRS-34560 and DDRS-39130

Models: ***SCSI-3 FAST-20 (50pin Single-Ended)***
SCSI-3 FAST-20 (68pin Single-Ended)
SCSI-3 FAST-20 (80pin Single-Ended SCA-2)
SCSI-3 FAST-40 (68 & 80pin (L)ow (V)oltage (D)ifferential)

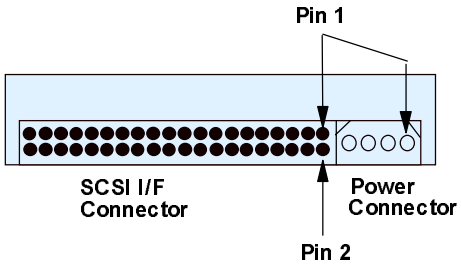
The performance characteristics of the DDRS drive family makes it ideal for many server applications, for workstation applications and for desktop applications where high performance and capacity are required. DDRS drives are also suitable for many AV applications and can be optimised for use in this environment. The drives spin at 7200 rpm, have sector servo, a media data rate of 109-171MB/sec and have PFA (SMART) and SCAM capability.

Applications

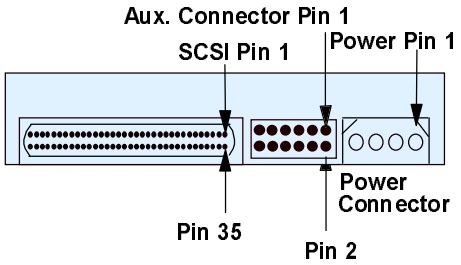
- High-end desktop
- Workstations
- Low/Medium capacity servers and arrays.

Features	*Benefits*
4.56GB and 9.13GB formatted capacities	*Popular capacity points*
Industry standard interface ***50 pin ANSI SCSI-3*** ***68 pin ANSI SCSI-3*** ***80 pin ANSI SCSI-3***	*High interface data rates* *20MB/sec data transfer speed* *40MB/sec (Fast 20) & 80MB/sec (Fast 40) data transfer speed* *40MB/sec (Fast 20) & 80MB/sec (Fast 40) data transfer speed*
109-171 Mbits/sec Media data rate ***Rotational speed 7200 rpm***	*High data rate across entire disk surface*
Sustained data rate 8.3-13.3 MB/s ***Average seek time 7.5 ms*** ***Average latency 4.33 ms***	*Fast access data*
Magneto resistive heads	*Areal density 1560 Mbit/sq in (Max)*
384 KB multi-segmented dual port data buffer	*Fast data retrieval in multi-tasking environments*
On-board SCSI bus terminator (50 & 68 pin Fast 20 models) ***SCAM 2 Compliant***	*Easy integration across multiple platforms*
Low command overhead ***Read ahead caching*** ***ECC on the fly***	*Improved data throughput* Write cache support
Industry standard mounting	*Ease of installation*
Predictive Failure Analysis (S.M.A.R.T. Compliant)	Improved data reliability

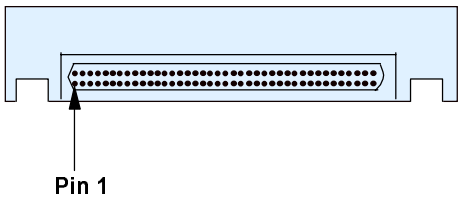
Connectors



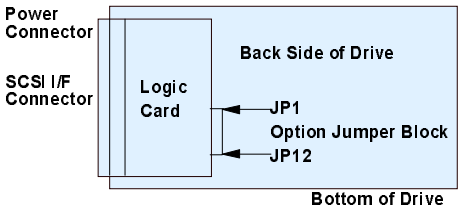
Electrical Connectors (rear view) 50 Pin models



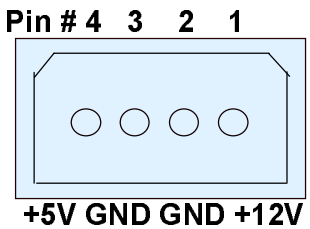
Electrical Connectors (rear view) 68 Pin models.



Electrical Connectors (rear view) 80 Pin models.



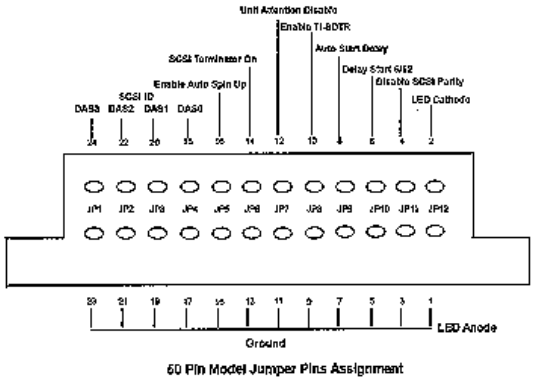
The DC power connector is designed to mate with AMP part 1-480424 (using AMP pins P/N 350078-4). Equivalent connectors may be used. Pin assignments are shown below, as viewed from the end of the drive.



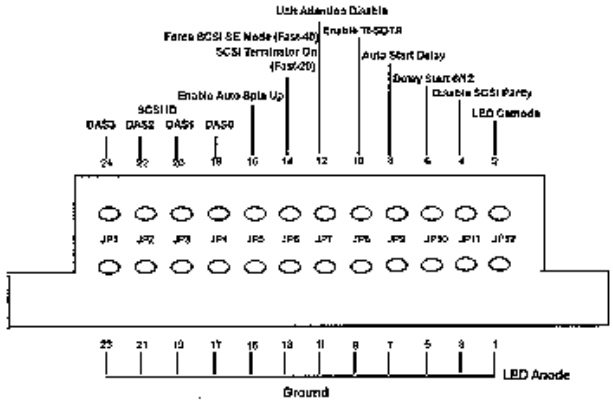
Option Block

Jumper Settings

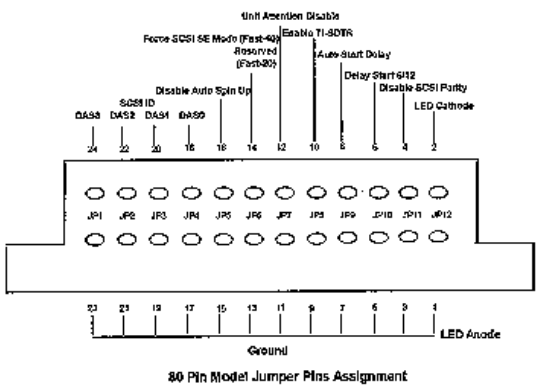
Jumper position and function are as shown below. Pin pitch is 2mm.



50 Pin Model Jumper Pins Assignment



68 Pin Model Jumper Pins Assignment



80 Pin Model Jumper Pins Assignment

Jumper Options

SCSI ID (Address) Pins
Note: In the address determination tables, "off" means jumper is not in place and "on" means jumper is in place.

50 pin model SCSI ID (Address) pins

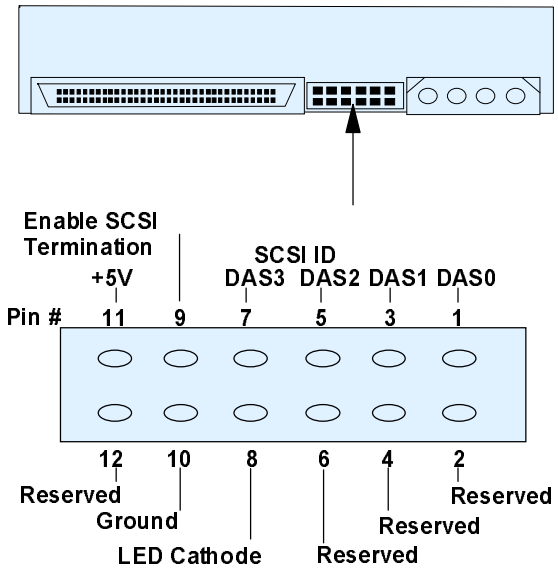
DSA2 JP2	DSA1 JP3	DSA0 JP4	Device ID
off	off	off	o
off	off	on	1
off	on	off	2
off	on	on	3
on	off	off	4
on	off	on	5
on	on	off	6*
on	on	on	7

* Shipping default ID

68 and 80 pin models SCSI ID (Address) pins

DAS3 JP1	DAS2 JP2	DAS1 JP3	DAS0 JP4	Device ID
off	off	off	off	0*
off	off	off	on	1
off	off	on	off	2
off	off	on	on	3
off	on	off	off	4
off	on	off	on	5
off	on	on	off	6**
off	on	on	on	7
on	off	off	off	8
on	off	off	on	9
on	off	on	off	10
on	off	on	on	11
on	on	off	off	12
on	on	off	on	13
on	on	on	off	14
on	on	on	on	15

* Shipping default ID for 80 pin drive
** Shipping default ID for 68 pin drive



68 Pin Auxiliary Connector

Disable / Enable Auto Spin Up (JP5)

This jumper controls how the drive starts when power is applied on 50 and 68 Pin Drives. If the jumper is installed then the file will spin up automatically after power-on reset. If the jumper is NOT installed the file will NOT spin up unless the host system issues a 'START UNIT' command to the file.
On 80 Pin Drives, if the Jumper is not installed then the file will join up automatically after Power-On Reset.
If the Jumper is installed the File will not spin up unless the Host System issues a "Start Unit" command to the File.

SCSI Terminator On (JP6)(Fast-20) / Force SCSI SE Mode (Fast-40)

On Fast-20 50 and 67 Pin Files, when this jumper is installed, the on-card SCSI bus terminator is enabled. No Terminator on 80 pin model. on Fast-40 68 and 80 Pin Files. When this Jumper is installed the file will operate in single ended SCSI Mode.
No Terminator on Fast-40 Files.

Unit Attention Disable (JP7)

When this jumper is installed the drive will not generate a Unit Attention following a Power On Reset (POR) or SCSI Bus Reset. Any pending Unit Attention conditions will also be cleared at POR or SCSI Bus Reset.

Enable TI-SDTR/Enable TI-SDTR/WDTR (JP8)

When the jumper is installed the drive will initiate Synchronous Data transfer speed negotiation (50, 68 and 80 pin) and initiate Wide Data transfer request (68 and 80 pin) following a SCSI bus Reset or power on event.

Auto Start Delay and Delay Start (JP9, JP10)

The Auto Start Delay and Delay Start pins control when and how the drive can spin up, with the combination of Auto Spin option (pin #5). When in Auto Spin up and Start Delay mode the drive start will be delayed by a period of time multiplied by its own SCSI address. If Auto Spin up is disabled, these jumpers will be ignored.

Enable Auto Spin up JP5	**Auto Start Delay JP9**	**Delay Start 6/12 JP10**	**Option**
off	don't care	don't care	Drive will NOT spin up Requires Start Command
on	off	off	Spin up immediately after POR
on	on	off	Spin up six seconds multiplied by SCSI address after POR
on	on	on	Spin up twelve seconds multiplied by SCSI address after POR

Disability SCSI parity (JP11)

When this jumper is installed, the drive's SCSI parity checking is disabled.

External Activity (LED) pins (JP12)

The LED pins can be used to drive an external Light Emitting Diode. Up to 8 mA of sink current capacity is provided. The LED Anode must be tied to the current limited +5V source provided on Pin # 1 of the Option Jumper Block. The LED Cathode is then connected to the Pin # 2 to complete the circuit.

Default Setting

The Default jumper setting at shipment is as follows. Jumpers installed on 50 and 68 pin models.

JP2, JP3	SCSI Address #6
JP5	Enable Auto Spin Up
JP6	SCSI Terminator enabled

SCSI Signal Connector

The SCSI 50 and 68 pin Signal Connector meets the ANSI SCSI specification. The SCSI SCA-80 pin Connector conforms to SFF 8046.

Note: It is intended that the hard disk should only be in electrical contact with the chassis of the system 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 except at the mounting holes or the side rails into which the mounting holes are tapped.

Operating Environment

Operating Conditions

Temperature	5° to 55°C
Relative Humidity	8 to 90% non-condensing
Maximum Temperature Gradient	15°C/Hour
Altitude	-300 to 3048m

Non-operating Conditions

Temperature	-40° to 65°C
Relative Humidity	5 to 95% non-condensing
Maximum Wet Bulb Temperature	35°C non-condensing
Altitude	-300 to 12,000m

Operating Environment

Note: The system is responsible to provide sufficient air movement to maintain drive temperatures below the maximums specified in the 'Cooling Requirements' section.

Operating Shock
The hard disk drive meets the following criteria while operating in respective conditions described below. There must be a delay between shock pulses, long enough to allow the drive to complete all necessary error recovery procedure.

No data loss
10G, 11ms half-sine shock pulse.
65G, 2ms half-sine shock pulse.

Non Operating Shock
The drive withstands the following shock without risk of existing data loss:
75G, 11ms half-sine pulse.
175G, 2ms half-sine pulse.

Operating and Non-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.

Cooling Requirements:
The system has to provide sufficient ventilation to maintain a surface temperature below 60°C at the center of the top cover of the drive.
the system has to provide sufficient ventilation to keep the limits of component temperature as shown below.

Maximum allowable module surface temperature

Module Name	Location *	Max Allowable Surface Temp
MPU+HDC	1	85°C
DRAM	2	90°C
SCSI Terminator	3	90°C
VCM+Spindle Driver	4	90°C
Channel	5	90°C

*(Refer to Module Location diagram later in this document).

WARNING: This disk drive can be damaged by w Electro-static Discharge, please follow recommended ESD procedures before unpacking or handling the drive. Ask your dealer if you need assistance

DC Power Requirements

The following voltage specifications apply at the file power connector. Hot plugging of drive power and SCSI cables is allowed. There is no special power on/off sequencing required.

Nominal Supply Voltages	+5 volts	+12 volts
Power Supply Ripple (mVp-p,0-10MHz)[1]	100max	150max
Tolerance[2]	±5%	±5%
Supply Current		
(Population Mean)[3]		
Idle (average)	0.31/0.32	0.31/0.45
R/W (average)	0.53/0.55	0.54/0.65
Seek (average)	0.40/0.40	0.85/0.95
Start Up (Peak)	0.27/0.27	2.00/2.00

Notes:

[1] The Maximum ripple is measured at input of the drive.

[2] To avoid damage to the file electronics; spikes on the 5V supply must not exceed 7V and spikes on the 12V supply must not exceed 15V.

[3] First figure is for DDRS-34560, second figure is for DDRS-39130.

During the file start up and seeking, 12 volt ripple is generated by the file (referred to as dynamic loading). If several files have their power daisy chained together then the power supply ripple plus other file's dynamic loading must remain within the regulation tolerance of ±7%. A common supply with separate power leads to each file is a more desirable method of power distribution.

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

Data Organisation

Logical Layout	**DDRS 34560**	**DDRS 39130**
Bytes per Sector	512	512
Number of Heads	5	10
Number if Disks	3	5
Number of LBAs	8925000	17850000
Total logical Data Bytes	4569600000	9139200000

SCSI Cable

In Single Ended operation the maximum cable length is 3.0 metres when using up to 4 drives. If you are using greater than 4 drives the cable length must be 1.5metres or less. In LVD mode the maximum cable length is 12.0metres.

SCSI Bus Terminator (50 and 68 pin Fast 20 models)

The file has an internal Active SCSI bus terminator, which can be controlled on/off at the drive Option block. The user is responsible for properly terminating and powering the SCSI bus in the using system.

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 (FFC) Rules and Regulations Part 15, Subject J-Computer Devices Uclass B Limits.

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

European Community (EC) directive number 89/336 related to EMC.

Mode Select Options

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

Page 0 **(10)**

Vendor unique Parameters

QPE- Quality Post Error	(0)
UQE - Untagged Queuing Enable	(1)
UAI - Unit Attention Inhibit	(0)
MRG - Merge G and P list	(0)
SCAM level	(10)
ARHES - Auto Reassign Hard Error Sites	(0)
CMDAC - Command Active	(1)
CPE - Current Processing Enable	(1)
CAEN-Command Age Limit Enable	(1)
IGRA - Igrore Reassigned LBA	(0)
AVERP - AV ERP Mode	(0)
EADM - Enable Automatic Drive Maintenance	(0)
ADC - Adaptive Cache Enable	(1)
LED Mode	(0h)
Command Aging Limit	(0030h)
QPE - Read Threshold	(0Ah)
QPE - Write Threshold	(0Ah)

Page 1

Read-Write Error Recovery Parameters

AWRE - Automatic Wire Reallocation Enable	(1)
ARRE - Automatic Read Reallocation Enable	(1)
TB - Transfer Block	(0)
RC - Read Continuous	(0)
PER - Post Error	(0)
DTE - Disable Transfer on Errol	(0)
DCR - Disable Correction	(0)
Read Retry Count	(01h)
Write Retry Count	(01h)
Recovery Time Unit	(0000h)

Page 2

Disconnect/Reconnect Parameters

Read Buffer Full Ratio	(00h)
Write Buffer EmDtv Ratio	(00h)

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.

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	(FFFFh)
Minimum Pre Fetch	(0)
Maximum Pre fetch	(FFFFh)
Maximum Pre Fetch Ceiling	(0)
Number of Cache Segments	(6)

Page A
Control Mode Page Parameters

Queue Algorithm Modifier	(0h)
QErr - Queue Error	(0)
Dque - Disable Queuing	(0)

Page 1A

Power Control

Standby	(0)
Standby Condition Timer	(00000000h)

Page 1C

Information Exceptions Control

DEXCPT - Disable Exception Control	(0)
Method of Reporting	(0h)
Interval Timer	(00000000h)
Report Court	(00000000h)

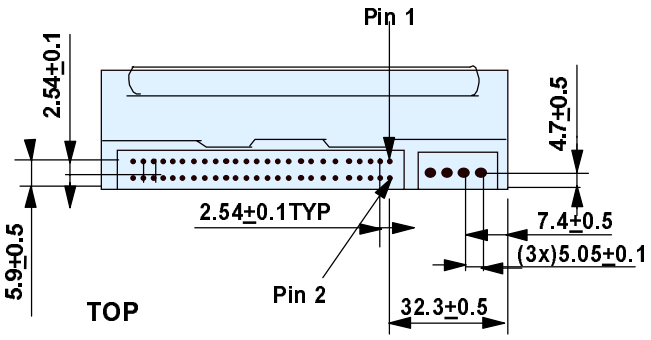
Note: (XX) saved options at Shipment

Mechanical Data
Dimensions

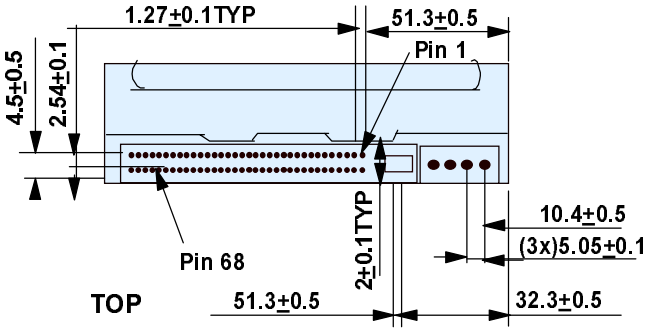
Height	25.4 ± 0.4mm
Width	101.6 ± 0.4mm
Depth	146.0 ± 0.6mm
Weight	630g maximum

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

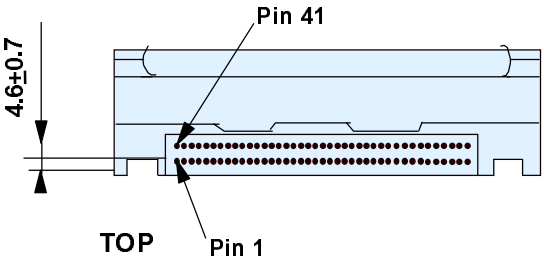
Connector Locations



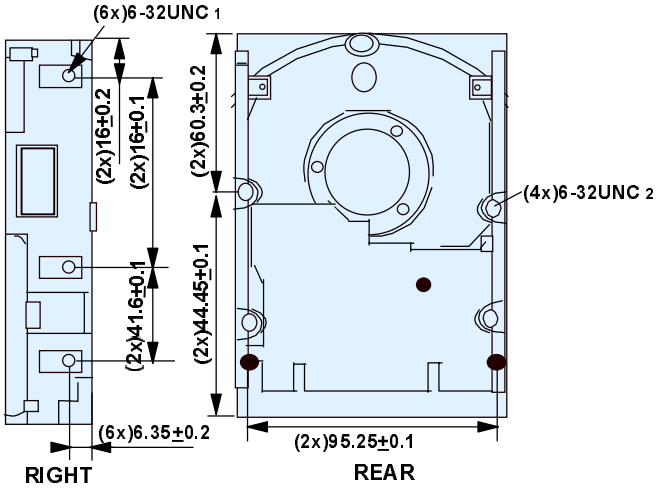
50 Pin Model Connector Locations



68 Pin Model Locations



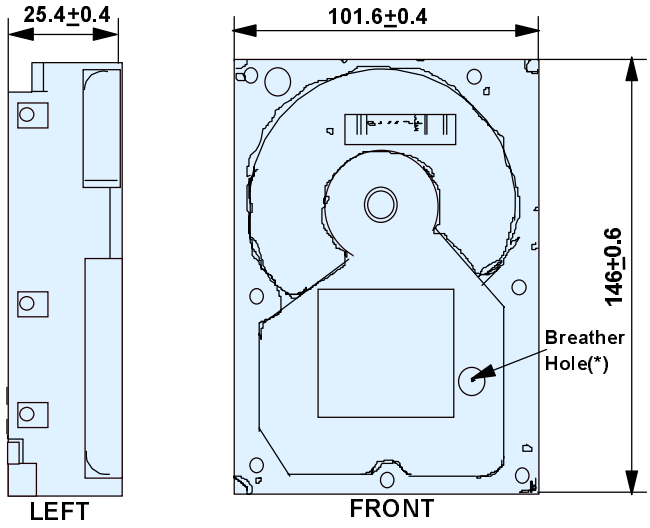
80 Pin Model Connector Locations



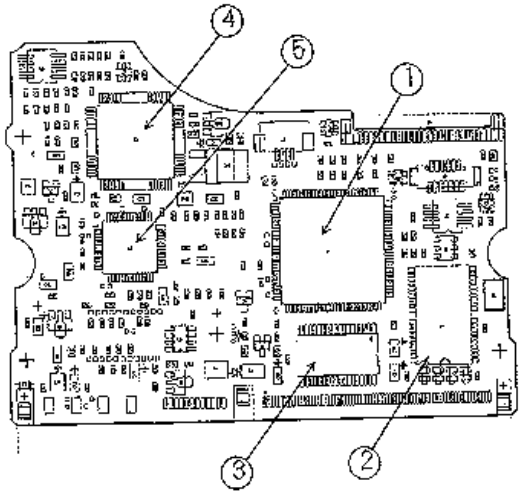
Recommended torque of mounting screws is 0.6 - 1.0Nm

1 Max allowable penetration of noted screw to be 3.5mm
2 Max allowable penetration of noted screw to be 6mm

Other Dimensions



* Do not block the breather hole



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