

I35MB - IDE 3.5" RAID-1 Mirrored Hard Disk Drive

The Adtron™ Diskpak™ model I35MB is a 3.5-inch mirrored hard disk and the perfect solution for applications that require greater reliability than delivered by a single disk installation. The I35MB applies mirroring technology in a 3.5-inch hard disk form factor and is designed for non-stop operation applications that require cost-effective reliability beyond that of a single disk drive.

Adtron ActiveRAID™ technology is built into the I35MB. With RAID-1 mirroring, the Adtron Diskpak model I35MB offers the functionality of disk arrays without the complexity and expense. RAID-1 mirroring between two hard disk drives provides data redundancy independent from the host CPU.

The I35MB incorporates the Adtron patented media controller, components, media and an industry standard interface, providing the foundation for Adtron ActiveRAID technology for non-stop operations.



I35MB

Diskpak™ Data Storage

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STANDARD FEATURES

The Adtron™ I35MB Diskpak™ storage subsystem includes the following standard features:

Form Factor	3.5-inch
Technology	Adtron ActiveRAID™ for non-stop operations, featuring RAID-1 mirroring
Interface Standard	ATA/ATAPI-5 ANSI NCITS340-2000
Mounting	Hard disk drive industry standard. The drive will operate in all axes (six directions).
Connector	Standard IDE 40-pin, High speed IDE interface
Transfer Modes	PIO Modes 0-4, Multiword DMA Modes 0-2, and UDMA Modes 0-4 are currently supported
Software Drivers	No software drivers are required for full IDE disk support as a boot and data storage device
Addressing	48-bit Logical Block Addressing supported
Sectors	Standard 512 byte sectors
Error Detection and Correction	<ul style="list-style-type: none"> • Reliability ensured by EDC and ECC defect management • ATA-compliant Self Monitoring, Analysis, and Reporting Technology (S.M.A.R.T), support health status and event logs • Full error detection and management without host intervention • Visual and audible indicators of mirror error • Operator initiated rebuild functions transparent to the host CPU
Firmware	Field upgradeable firmware prevents future obsolescence
Input Voltage	5V +/- 5%
Operating Temperatures	Commercial operating temperature range from +5 to +55°C
Warranty	3 Years

Table 1 Standard Features

OPTIONAL FEATURES

Customers may request the following optional features. Check with your Adtron representative for more information.

- Enhanced Availability: Enhanced Power on Hours (POH) and duty cycle specifications

APPLICATIONS

Below is a list of potential embedded applications in which the I35MB may be implemented:

- Industrial automation equipment
- Ground based defense applications
- Network routers
- Telecommunications platforms
- Embedded data servers
- High availability workstations

MIRROR OPERATION

A disk mirror is a pairing of drives in separate banks. Both drives hold copies of the same data. When writing to the pair, data is transferred to both drives simultaneously. When reading from the pair, both drives are read with one copy of the data sent to the host. Should an error occur, a fault will be indicated.

A drive can be taken off-line for two reasons:

1. A faulted hard disk error occurs during a drive access.
2. The operator initiates an off-line request by pressing the push-button ("mirror control").

Two LEDs are used to indicate the current state of each disk bank. Refer to the I35MB Operations Manual for LED activity descriptions.

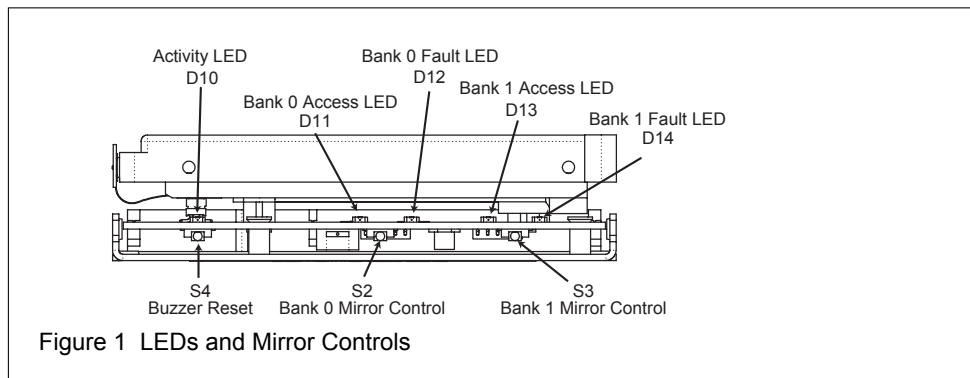
While a drive is off-line, the other drive handles all read and write operations. Power is removed from the off-line drive in anticipation of the operator extracting the defective device.

The operator may take the necessary actions to replace the drive, if required, and perform a rebuild.

When a rebuild is issued, all sectors from the operational drive are copied to the new drive. Host operations are not interrupted. During the rebuild, new data from the host updates both disks and rebuild progress is recorded. If the I35MB is powered down during a rebuild, when power is restored the rebuild will begin at the last good location.

LED Indicators and Mirror Control

Figure 1 below shows the back view of the I35MB and LEDs and Mirror control buttons. Table 2 defines these LEDs and Mirror controls.



LED Assignments and Mirror Controls

LED	Description
D10	Activity Host Access
D11	Bank 0 Access
D12	Bank 0 Fault
D13	Bank 1 Access
D14	Bank 1 Fault
S4	Buzzer Reset
S2	Bank 0 Mirror control
S3	Bank 1 Mirror control

Table 2

PHYSICAL CHARACTERISTICS

Parameter	Value (Typ)
Height	25.3mm [.997"]
Depth	146.1mm [5.750"]
Width	101.6mm [4.00"]
Weight	326.5g [11.52oz]

Table 3

PERFORMANCE

Item	Performance
Read (Sustained)	14 MB/second
Write (Sustained)	14 MB/second

Table 4

RELIABILITY

Item	Value
MTBF	Dependent on specific hard disk drive model and operating conditions. Contact Adtron for more details.
Bit Error Rate (BER)	< 1 non-recoverable error in 10 ¹⁴ bits read

Table 5

ENVIRONMENTAL

Parameter	Unit	
Relative Humidity	5% to 90%, noncondensing	
Altitude	-300m to 3,048m (10,000ft)	
Operating Environments	Operating Shock (SRS)	150g @ 2ms, 15g @ 11ms
	Operating Vibration-random	1g (5 - 500Hz) @ 2.0 oct/min

Table 6

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Vcc	Vcc	4.75	5	5.25	V
Commerical operating temperature	Ta	5	25	55	°C

Table 7

POWER REQUIREMENTS

Parameter (Note 1)	Value (Typical)	Unit	Value (Typical)	Unit
Sustained Read	.900	A	4.50	W
Sustained Write	1.200	A	6.00	W
Startup	2.000	A	--	--
Idle	.600	A	3.00	W

Table 8

Note 1: With two (2) 80 GByte drives

IDE BUS DC CHARACTERISTICS

Parameter Symbol	Parameter Description	Test Conditions	Min	Max	Unit
VIH	Voltage Input High		2.0	Vcc + 0.5	V
ViL	Voltage Input Low		Vss -0.5	0.8	V
VoH	Voltage Output High	IOH = -4mA	2.4	VCC	V
VoL	Voltage Output Low	IOL = 4mA	VSS	0.5	V
Vcc	Vcc		-0.3	+6.0	V
Vin, Vout	All input/output voltages		-0.3	Vcc +0.3	V
C	Capacitance			20.0	pF

Table 9

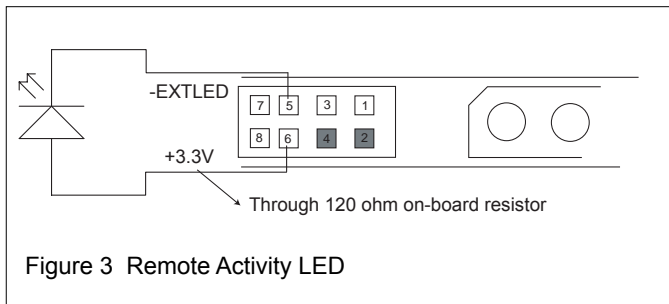
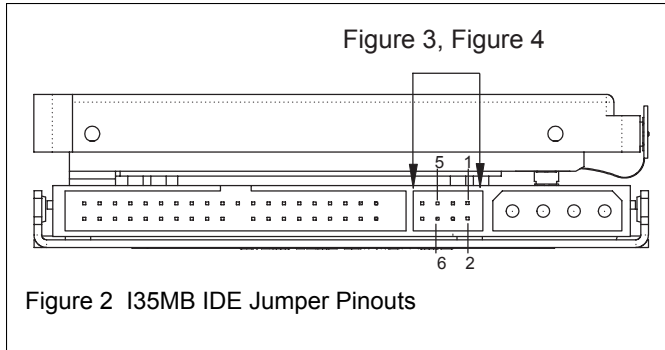
COMPLIANCE

EMI	CE, CSA
Safety	CE, UL

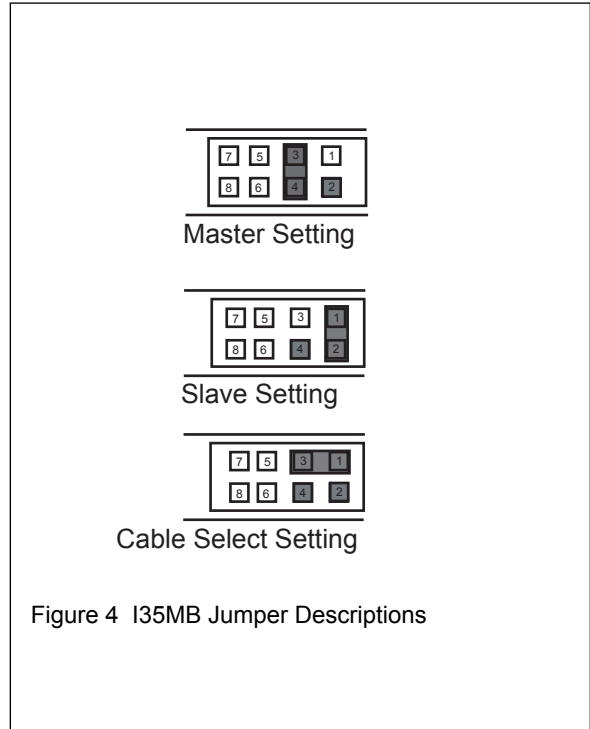
Table 10

JUMPER DESCRIPTIONS

The figures below show the jumper configurations for the I35MB.



Grayed pins are ground



Jumper Configurations

The master/slave and remote-mounted Activity LED jumper is located on the front of the I35MB between the IDE and power connectors. Figure 2 shows the front view of the I35MB's 40-pin connector and the location of the jumpers. Refer to Table 13 for IDE jumper signals. Figure 4 shows the valid jumper descriptions of configurations for master, slave, and cable select. By default, the I35MB is set to master. Pins 5 and 6, shown in Figure 3, are used for a remote-mounted Activity LED.

PIN CONFIGURATION

Signal Connector Pinout

Pin #	Signal	Pin #	Signal
1	-RESET	2	GND
3	DD7	4	DD8
5	DD6	6	DD9
7	DD5	8	DD10
9	DD4	10	DD11
11	DD3	12	DD12
13	DD2	14	DD13
15	DD1	16	DD14
17	DD0	18	DD15
19	GND	20	KEY
21	DMARQ	22	GND
23	-DIOW	24	GND
25	-DIOR	26	GND
27	IORDY	28	CSEL
29	-DMACK	30	GND
31	INTRQ	32	-IOCS16
33	DA1	34	-PDIAG
35	DA0	36	DA2
37	-CS0	38	-CS1
39	-DASP	40	GND

Table 11 Signal Connector Pinout

Signals preceded with a dash (-) are active low as the asserted state. Signals without a dash are asserted high.

Power Connector Pinout

Pin #	Description
1	No Connect
2	Ground
3	Ground
4	+5V

Table 12 Power Connector Pinout

IDE Jumper Pinout

Pin #	Signal
1	-SLAVE
2	GND
3	-MASTER
4	GND
5	-EXTLED
6	RES to +3V
7	No Connect
8	No Connect

Table 13 IDE Jumper Pinout

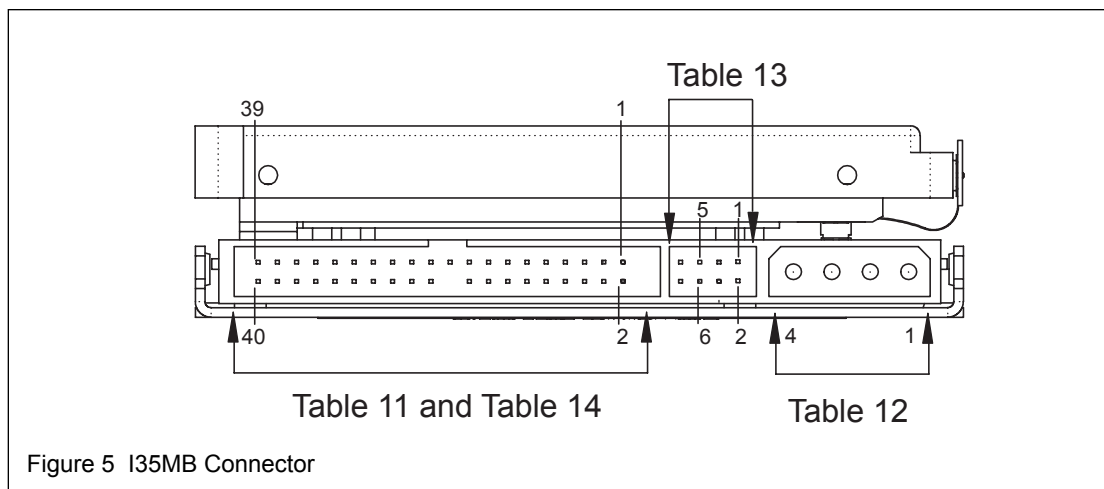


Figure 5 I35MB Connector

CONNECTOR CONFIGURATION

Signal Name	Dir	Pin	Description
DA[2:0]	I	36, 33, 35	DA2-DA0 are used to select the one of eight registers in the Task File.
-CS[1:0]	I	38, 37	-CS0 is the chip select for the Task File registers while -CS1 is used to select the Alternate Status Register and the Device Control Register.
CSEL	I	28	Cable select. This internally pulled-up signal is used to configure this device as a Master or a Slave. When the pin is grounded, this device is configured as a Master. When the pin is open, this device is configured as a Slave.
DD[15:0]	I/O	18, 16, 14, 12, 10, 8, 6, 4, 3, 5, 7, 9, 11, 13, 15, 17	All Task File operations occur in byte mode on the low order bus DD0-DD7 while all data transfers are 16-bit using DD0-DD7.
-DASP	I/O	39	This input/output is the Disk Active/Slave Present signal in the Master/Slave handshake protocol.
DMARQ	O	21	DMA transfer request issued to host.
-DMACK	I	29	DMA request acknowledged by host.
-DIOW: STOP:	I	23	This I/O Write strobe pulse is used to clock I/O data on the Card Data bus into the Drive controller registers when the Drive is configured to use the I/O interface. The clocking will occur on the negative to positive edge of the signal (trailing edge). During Ultra DMA, this is the stop signal.
-DIOR: -HDMARDY: HSTROBE:	I	25	This is an I/O Read strobe generated by the host. This signal gates I/O data onto the bus from the drive. Ultra DMA control signal used to extend host transfer cycles.
INTRQ	O	31	Signal used to interrupt host when service is requested.
-IOCS16	O	32	This output signal is asserted low when the device is expecting a word data transfer cycle.
IORDY: -DDMARDY: DSTROBE	O	27	This output signal may be used as IORDY. Ultra DMA control signal used to extend host transfer cycles.
Key	--	20	This pin is keyed so that the drive can only be connected with the cable pin 1 to the drive pin 1.
-PDIAG -CBLID	I/O	34	This input/output is the Pass diagnostic signal in the Master/Slave handshake protocol. Also, cable assembly type identifier.
-RESET	I	1	This input pin is the active low hardware reset from the host.
GND	--	2, 19, 22, 24, 26, 30, 40	Ground

Table 14 40-Pin Signal Description

PACKAGE DIMENSIONS

Refer to the figure below for the enclosure and mounting dimensions of the I35MB 3.5" drive. Dimensions are shown in mm[inches].

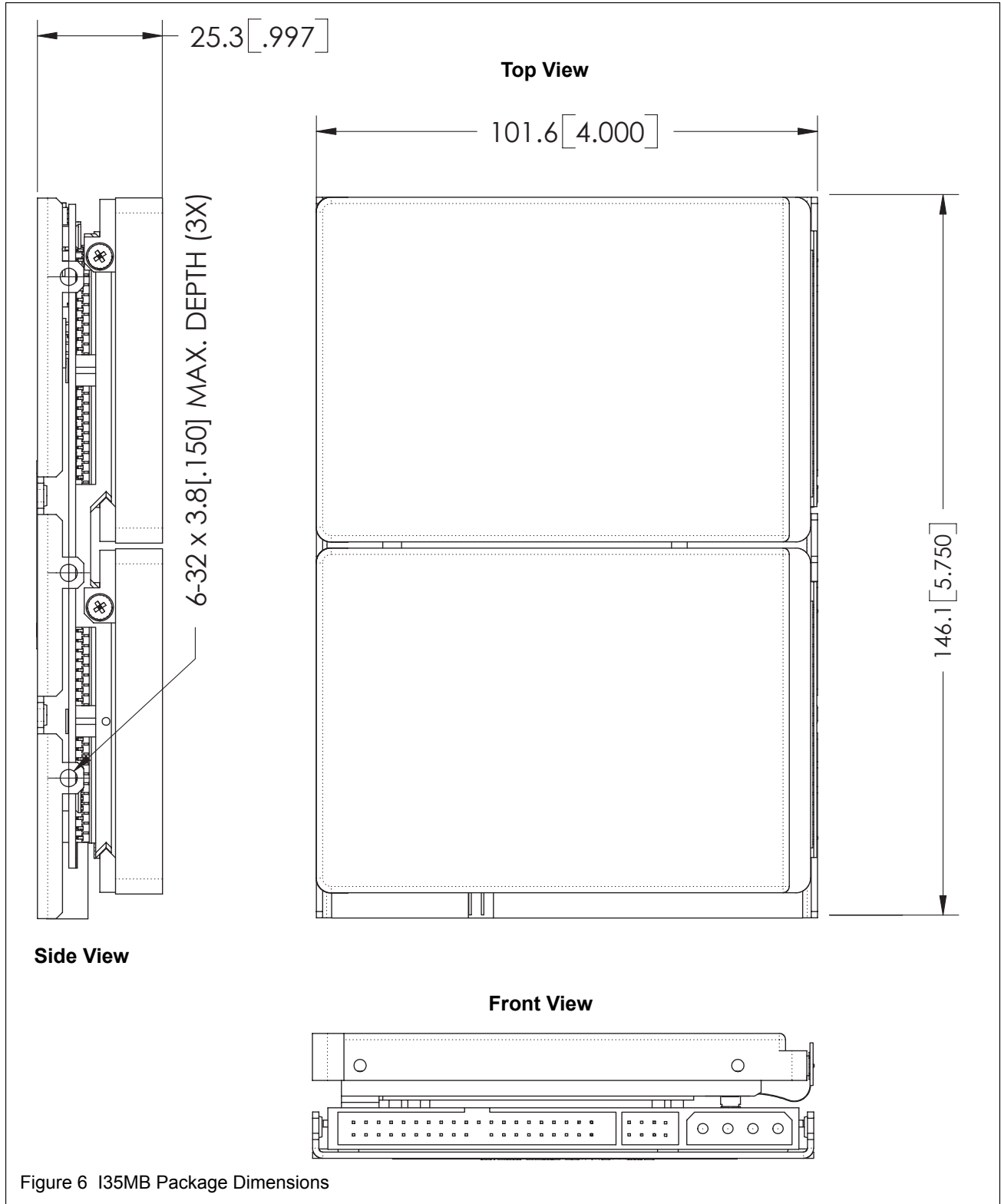
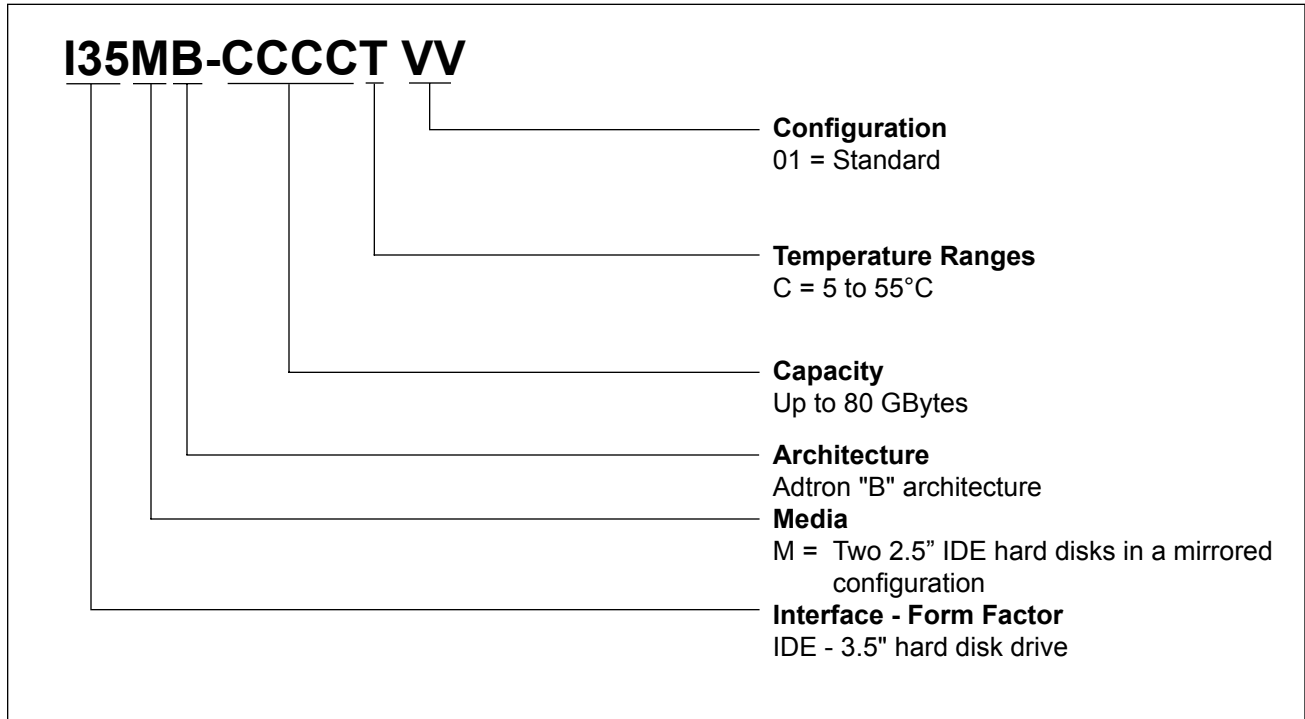


Figure 6 I35MB Package Dimensions

ORDERING INFORMATION



Capacity Options (G = GBytes)	Height (Typ)
20G, 40G, 60G, 80G	25.3mm [.997"]

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