

## OVERVIEW

The SiliconDrive II USB 10-pin Module is designed to meet the low power and small size requirements of embedded systems.

SiliconDrive II technology is engineered exclusively for the high performance, high reliability and multi-year product lifecycle requirements of the Enterprise System OEM market. Typical end-market applications include broadband data and voice networks, military systems, flight system avionics, medical equipment, industrial control systems, video surveillance, storage networking, VoIP, wireless infrastructure, and interactive kiosks.

Every SiliconDrive II USB 10-pin Module is integrated with SiliconSystems patented PowerArmor and patent-pending SiSMART and SiSecure technologies.

PowerArmor prevents data corruption and loss from power disturbances by integrating patented technology into every SiliconDrive II.

SiSMART acts as an early warning system to eliminate unscheduled downtime by constantly monitoring and reporting the exact amount of remaining storage system useful life.

SiSecure is a comprehensive suite of user-selectable security technologies that solves the critical need for robust storage security for embedded systems applications that have a small footprint and low-power requirement.

## SiSECURE

SiZone	Data zones with different security parameters.
SiKey	Ties SiliconDrive to a specific host and/or software IP.
SiProtect	Protection software for password-required, read/write, or read-only access.
SiSweep	Ultra-fast data erasure.
SiPurge	Non-recoverable data erasure.
AutoLock	Automatically locks the SiliconDrive.

## FEATURES

- RoHS 6 of 6 compliant
- Integrated PowerArmor, SiSMART, and SiSecure technology
- Capacity range: 1GB to 8GB
- MTBF 4,000,000 hours
- 0.1-inch connector pin pitch



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## REVISION HISTORY

Document No.	Release Date	Changes
4000MU-11DSR	February 2, 2009	<p><b>Updated:</b></p> <ul style="list-style-type: none"> <li>• "System Reliability" table and changed the name to "Reliability."</li> <li>• "Related Documentation" table.</li> </ul> <p><b>Added:</b></p> <ul style="list-style-type: none"> <li>• "Projected Operational Life Span."</li> </ul>
4000MU-12DSR	October 23, 2008	<p><b>Updated:</b></p> <ul style="list-style-type: none"> <li>• "Host Interface 2x5 Header" table.</li> <li>• "2x5 Connector Pinout (Bottom View) figure."</li> <li>• "DC Characteristics" table.</li> </ul> <p><b>Removed:</b></p> <ul style="list-style-type: none"> <li>• "I/O Access Read Timing."</li> <li>• "I/O Access Write Timing."</li> </ul>
4000MU-11DSR	August 12, 2008	Updated capacity range to 8GB.
4000MU-10DSR	June 12, 2008	Updated the "2x5 Connector Pinout (Bottom View)" figure.
4000MU-09DSR	May 29, 2008	<p><b>Updated:</b></p> <ul style="list-style-type: none"> <li>• "SiSecure."</li> <li>• "Features."</li> <li>• "Standard On-Board USB Header" to "Standard USB Header."</li> <li>• "System Power Requirements" table.</li> <li>• "Absolute Maximum Ratings" table.</li> <li>• "DC Characteristics" table.</li> <li>• "Part Numbering Nomenclature" table.</li> </ul> <p><b>Removed:</b></p> <ul style="list-style-type: none"> <li>• "System Reliability" table.</li> <li>• "DC Characteristics for Full-Speed Operation" table.</li> </ul>

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Document No.	Release Date	Changes
4000MU-08DSR	May 7, 2008	<b>Updated:</b> <ul style="list-style-type: none"> <li>• "Overview."</li> <li>• "System Performance" table.</li> <li>• "System Power Requirements" table.</li> </ul> <b>Removed:</b> <ul style="list-style-type: none"> <li>• "Product Capacity Specifications."</li> <li>• "Impedance."</li> </ul>
SSDS07-4000MU-R	April 3, 2008	External initial release with internal updates.
SSDS06-4000MU-RP	March 20, 2008	Internal updates.
SSDS05-4000MU-R	February 8, 2008	Internal updates.
SSDS04-4000MU-RP	November 2, 2007	Internal updates.
SSDS03-4000MU-RP	August 27, 2007	Internal updates.
SSDS02-4000MU-RP	May 31, 2007	Internal updates.
SSDS01-4000MU-RP	May 10, 2007	Internal updates.
SSDS00-4000MU-RP	February 27, 2007	Initial internal release.

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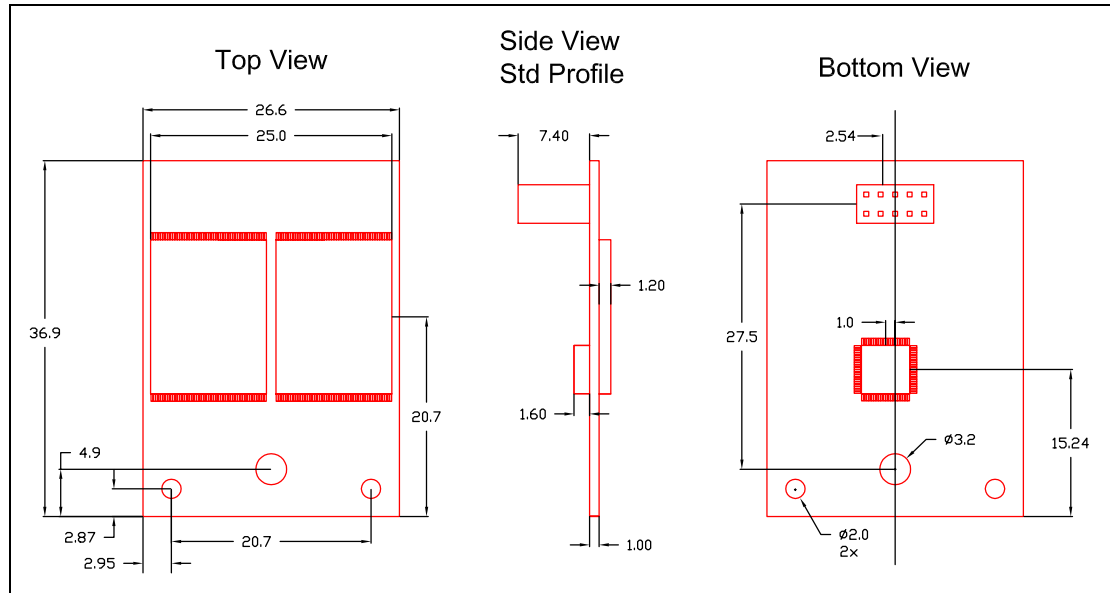
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# PHYSICAL SPECIFICATIONS



**Figure 1: Physical Dimensions**

SiliconDrive II USB 10-pin Module is available in a horizontal version with a 2x5-pin electrical interface.

## STANDARD USB HEADER

The following table lists the host interface header pins and signals.

**Table 1: Host Interface 2x5 Header**

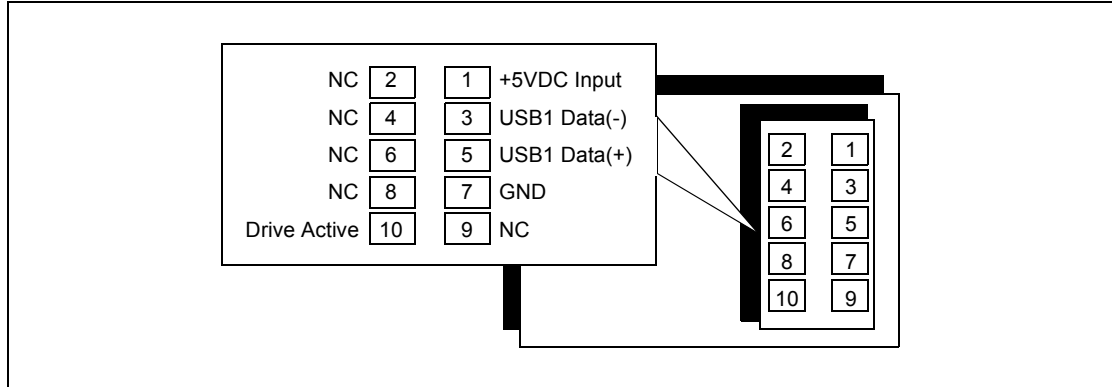
Pin	Signal	Pin	Signal
1	+5VDC	2	NC
3	USB1 Data(-)	4	NC
5	USB1 Data(+)	6	NC
7	GND	8	NC
9	Key (no pin)	10	Drive Active

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### CONNECTOR

The following figure illustrates the USB 10-pin Module 2x5 device interface connector.



**Figure 2: 2x5 Connector Pinout (Bottom View)**

### PRODUCT SPECIFICATIONS

**Note:** All SiliconDrive II USB 10-pin Module values quoted are typical at 25°C and nominal supply voltage.

### SYSTEM PERFORMANCE

**Table 2: System Performance**

Read Transfer Rate (Typical)	20MBps
Write Transfer Rate (Typical)	16MBps

### SYSTEM POWER REQUIREMENTS

**Table 3: System Power Requirements**

DC Input Voltage	5.0 ± 5%
Sleep (Standby Current)	<500uA
Read (Typical)	100mA
Write (Typical)	110mA

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**RELIABILITY****Table 4: Reliability**

MTBF (@ 25°C)	4,000,000 hours
Bit Error Rate	<1 non-recoverable error in 10 <sup>14</sup> bits read

**PROJECTED OPERATIONAL LIFE SPAN****Table 5: Operational Life Span**

SiliconDrive Part#	Capacity	Service Life*	GB Written per Day
SSD-M08GU-4000	8GB	64.9 Years	@ 337.5GB
SSD-M04GU-4000	4GB	32.5 Years	@ 337.5GB
SSD-M02GU-4000	2GB	16.2 Years	@ 337.5GB
SSD-M01GU-4000	1GB	8.1 Years	@ 337.5GB

\* There are unlimited read cycles. Service life is determined using SiliconSystems' LifeEst calculation at 100% duty cycle with 25% write cycles.

LifeEst is a comprehensive measurement that considers numerous factors to determine the projected life span of a SiliconDrive. A white paper that describes the benefits of LifeEst and how to calculate it can be found at [http://www.siliconsystems.com/resources/Documents/Whitepaper/SiliconSystems\\_NAND\\_Evolution.pdf](http://www.siliconsystems.com/resources/Documents/Whitepaper/SiliconSystems_NAND_Evolution.pdf).

The actual life of a SiliconDrive is dependant on the customer usage model. SiSMART is a patented technology of SiliconSystems that enables host systems to monitor actual usage of a SiliconDrive in real time. SiSMART measures and reports the remaining life of a SiliconDrive. For more information on SiSMART, refer to the *Eliminating Unscheduled Downtime by Forecasting Useable Life* white paper at [http://www.siliconsystems.com/technology/pdfs/SiliconDrive\\_SiSMART.pdf](http://www.siliconsystems.com/technology/pdfs/SiliconDrive_SiSMART.pdf).

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**ENVIRONMENTAL SPECIFICATIONS****Table 6: Environmental Specifications**

Temperature	0°C to 70°C (Commercial) -40°C to 85°C (Industrial)
Humidity	8% to 95% non-condensing
Vibration	16.3gRMS, MIL-STD-810F, Method 514.5, Procedure I, Category 24
Shock	1000G, Half-sine, 0.5ms Duration 50g Pk, MIL-STD-810F, Method 516.5, Procedure I
Altitude	80,000ft, MIL-STD-810F, Method 500.4, Procedure II

**ABSOLUTE MAXIMUM RATINGS****Table 7: Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	$T_S$	-55	125	°C
Operating Temperature*	$T_A$	-40	85	°C
$V_{CC}$ with Respect to GND	$V_{CC}$	-0.3	6.0	V
Input Voltage	$V_{IN}$	-0.3	6.0	V
Input/Output Voltage	$V_{IO}$	-0.3	$V_{CC} + 0.3$	V

\* = Industrial temperature version.

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## DC CHARACTERISTICS

Table 8: DC Characteristics

Parameter	Symbol	Test Conditions	Minimum	Typical	Maximum	Unit
Supply Voltage	$V_{CC}$	-	4.75	5.00	5.25	V
Supply Current (RMS):						
Operating	$I_{CC}$	$V_{CC} = 5.0V$	-	100	110	mA
Suspend	$I_{CCS}$	$V_{CC} = 5.0V$	-	<500	<500	$\mu A$
Max Current Consumption (Peak Value)	-	-	-	-	250 @ 3.15V	mA
Input Levels USB Signals (D+, D-):						
Low	$V_{IL}$	-	-0.3	-	0.8	V
High	$V_{IH}$	-	2.0	-	$V_{CC} + 0.3$	V
Output Voltage USB Signals (D+, D-):						
Low	$V_{OL}$	$I_{OL} = 2mA$	-	-	0.4	V
High	$V_{OH}$	$I_{OH} = -2mA$	2.4	-	-	V
Output Signal Crossover Voltage USB Signals (D+, D-)	$V_{CRS}$	-	1.3	-	2.0	V

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## SALES AND SUPPORT

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## PART NUMBERING

### NOMENCLATURE

The following table defines the SiliconDrive II USB 10-pin Module part numbering scheme.

**Table 9: Part Numbering Nomenclature**

<b>SSD-</b>	<b>M</b>	<b>YYY</b>	<b>I</b>	<b>T</b>	<b>-4000</b> Part number suffix — contact your SiliconSystems' Sales Representative
					Temperature Range: • Blank = Commercial • I = Industrial
					Interface: U = USB
					Capacity: 01G to 1GB to 08G = 8GB
					Form Factor: M = USB Module
SiliconSystems' SiliconDrive					

### PART NUMBERS

The following table lists the SiliconDrive II's part numbers.

**Table 10: Part Numbers**

Part Number	Capacity
SSD-M08GU(I)-4000	8GB
SSD-M04GU(I)-4000	4GB
SSD-M02GU(I)-4000	2GB
SSD-M01GU(I)-4000	1GB

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## ROHS 6 OF 6 PRODUCT LABELING — PB-FREE IDENTIFICATION LABEL



The Pb-free identification label indicates that the enclosed components/ devices and/or assemblies do not contain any lead (i.e., they are lead-free, as defined in RoHS directive 2002/95/ED). The above symbol is on all RoHS 6 of 6 compliant product labels.

## RELATED DOCUMENTATION

For more information, visit [www.siliconsystems.com](http://www.siliconsystems.com) or contact your SiliconSystems Sales Representative.

**Table 11: Related Documentation**

<b>SiliconDrive II</b>		
<b>Application-Specific Description</b>		<b>Document Number</b>
<b>Technology</b>		
SiProtect	Protection software for password-required, read/write, or read-only access.	WP-003-0xR
SiSweep	Ultra-fast data erasure.	SiSecure-0xANR
SiPurge	Non-recoverable data erasure.	SiSecure-0xANR

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