Intel® Z-U130 Value Solid State Drive

Datasheet

Product Features

- Capacities
  - — 1 GB, 2 GB, and 4 GB
- Performance
  - — Sequential Read: 28 MB/sec
  - — Sequential Write: 20 MB/sec
  - — IOPS*: 100 (4 KB, 2:1 Read vs. Write)
- RoHS Compliant
- CE, FCC and UL certified
- Supports USB 2.0/1.1 specification
- NAND management
  - — Error correction code: 4 symbol
  - — Active wear leveling algorithm (static and dynamic)
- Operating temperature
  - — 0°C - 70°C
- Typical Active Current: 80 mA
- Typical Idle Current: 65 mA
- Standard and low profile connectors
- Package dimensions
  - — 36.9 x 26.6 x 5.88 mm (low profile)
  - — 36.9 x 26.6 x 9.6 mm (standard)
- Endurance
  - — Mean Time Between Failure (MTBF) 5,000,000 hours
  - — 5 Years Useful Life

Intel's Z-U130 Value Solid State Drive (SSD) is a USB 2.0 storage solution built around high performance Intel® NAND flash memory. This module uses single-level cell Intel NAND flash memory with cache programming and dual plane feature set designed to improve overall module performance. Additionally each module has two TSOP packages attached to the printed circuit board with densities varied by the number of die within each package (i.e. 2 GB = 2 X 512 MB die per package and 4 GB = 4 X 512 MB die per package). The Intel Z-U130 Value SSD supports the Universal Serial Bus (USB) Specification v2.0 and is backward compatible with v1.1. The module uses industry standard connectors which are available in two sizes. This device can be used with operating systems compatible with the USB Mass Storage Class specification v1.0.

Note: I/O Operations Per Second (IOPS) measured with IOMETER 2003.12.6.

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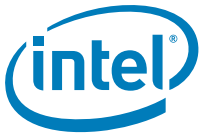
July 2007



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Revision History

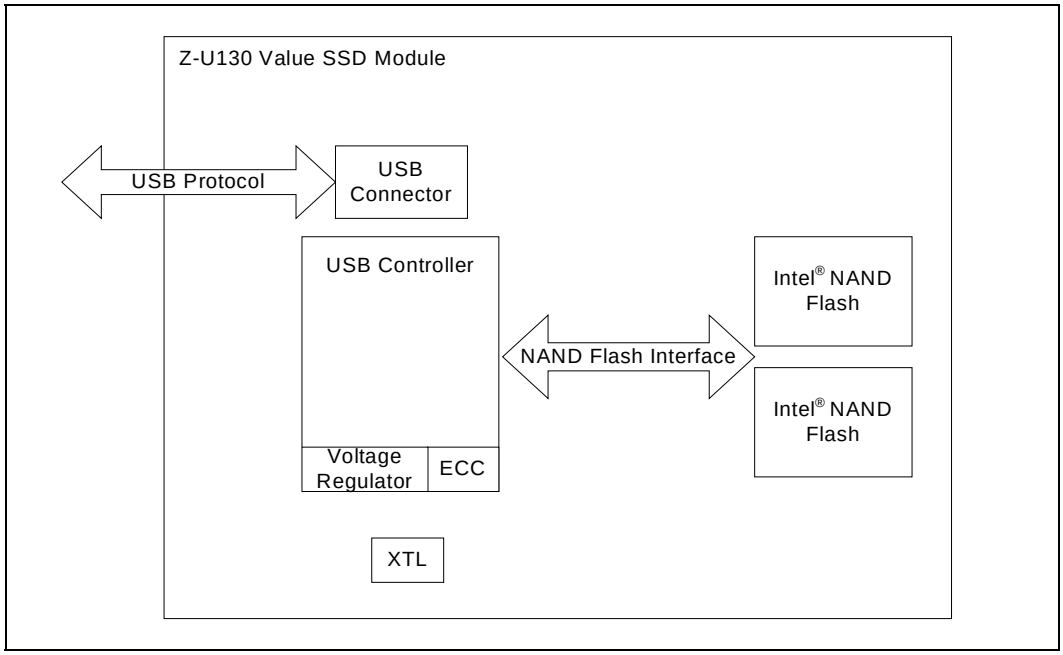
Revision Date	Revision	Description
Mar - 07	001	Intital Release.
July - 07	002	Updated MTBF specification, ordering information, and certifications. Removed extended temperature information and LED in block diagram.

1.0 Functional Overview

1.1 Architecture

This solid state drive combines Intel® NAND Flash memory and a USB controller to deliver a reliable and durable solution for embedded and thin client markets. The system is based on a Single Level Cell (SLC) flash technology which is ideal for the needs of high performance platforms. All capacity options of this module contain two NAND flash devices. The high speed USB 2.0 controller includes 4 symbol error correction capability as well as wear-leveling algorithms for enhanced NAND management. The controller is backward compatible to the USB 1.1 specification and complies with USB Mass Storage Class Specification v1.0. There are two connector options to ease migration into platforms. The standard and low profile connectors both support the standard USB interface.

Figure 1. Intel Z-U130 Value SSD Functional Block Diagram



1.2 Useful Product Life

Product life is at least five years or 43,800 power-on hours whichever comes earlier under the following conditions:

- Power-on hours: 8,760 per year
- Operating Time: 100% of power-on hours
- Active/Idle duty cycle: 90% of the time
- 1 GB Module Write Rate: 12 GB per day (at 6 days a week, 52 weeks a year for 5 years)[1,2]
- Environmental: typical operating conditions

Notes:

1. Write rate of 12 GB/day is multiplied by module density. Therefore a 2 GB module Write Rate is 24 GB/day and a 4 GB module Write Rate is 48 GB/day.
2. Assumes a data streaming usage model. Please contact Intel Applications Engineering for applicability of other use models.

1.3 Mean Time Between Failure

The Mean Time Between Failure (MTBF) is calculated based on a Part Stress Analysis. MTBF for Intel's Z-U130 Solid State Drives is five million hours.

Conditions for the calculation are as follows:

- Power-On hours: 8,760 per year
- Operating time: 100% of power-on hours
- Active/Idle duty cycle: 90% of the time
- Environmental Conditions: typical operating ranges

1.4 Shock and Vibration

Non-operating shock: 600 G/2 mS

Non-operating vibration: 5-500 Hz; 3.13 G

Operating vibration: 5-40 Hz; 1.1 G

1.5 Electrostatic Discharge (ESD)

Intel Z-U130 SSD can withstand an electrostatic discharge of +/- 4 KV. ESD testing is done to demonstrate that the units can withstand discharge encountered in normal handling or operation of the equipment.

1.6 Regulatory Certifications

The Intel® Z-U130 Value SSD is compliant with the Restriction of Hazardous Substances (RoHS) directive. It also conforms with the following standards:

- FCC 47CFR part 15 subpart B class B
- CE Mark for European consumer electronics compliance
- UL 60950-1:2003

1.7 Product Label

Each module has a label covering both flash chips which identifies:

- Product name
- Density
- Tracking and revision numbers
- FCC and lead free compliance

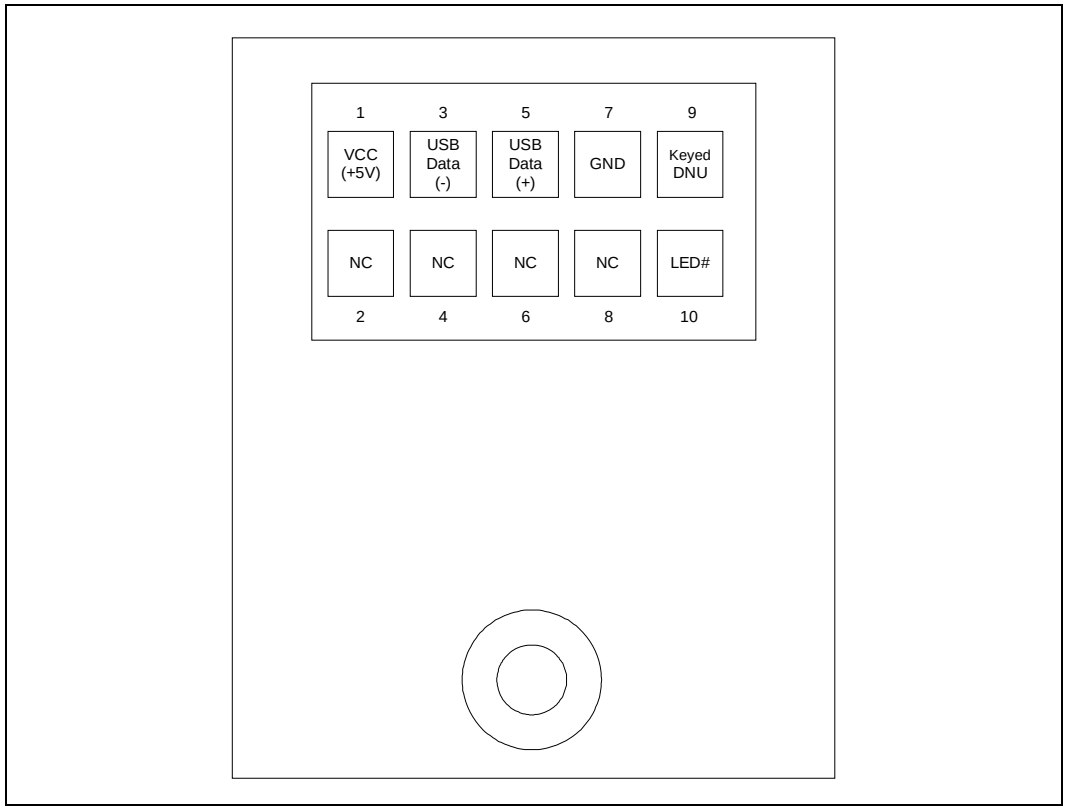
Figure 2. Intel Z-U130 Value SSD Label

1.8 Reference Documents

USB 2.0 Reference Document is located at http://www.usb.org/developers/docs/ and contains the USB 2.0 specification, USB Technical documents, USB-IF Compliance Test procedures, and other USB related documents.

2.0 Signal Pin Assignments and Descriptions

Figure 3. Pin Assignment (Bottom View) 2x5 Connector



Note: Not drawn to scale.

Table 1. Signal Descriptions

Symbol	Type	Description
USB_Data	I/O	Data inputs/outputs: The bidirectional I/Os transfer address, data, and instruction information.
LED#	Output	LED#: Connection for an LED on the PCB which indicates if the drive is active or idle. LED is not populated on production boards.
Vcc	Supply	Vcc: Power supply.
Vss	Supply	Vss: Ground connection.
NC	–	No connect: NCs are not internally connected. They can be driven or left unconnected.
DNU	-	Do not use: DNUs must be left unconnected.

3.0 Mechanical Information

There are two options for connectors. There is a standard profile (7.4 mm high) 2x5 electrical connector and a low profile (3.6 mm) 2x5 connector version. Both versions have a mounting hole opposite the electrical connector in order to secure the board to a platform.

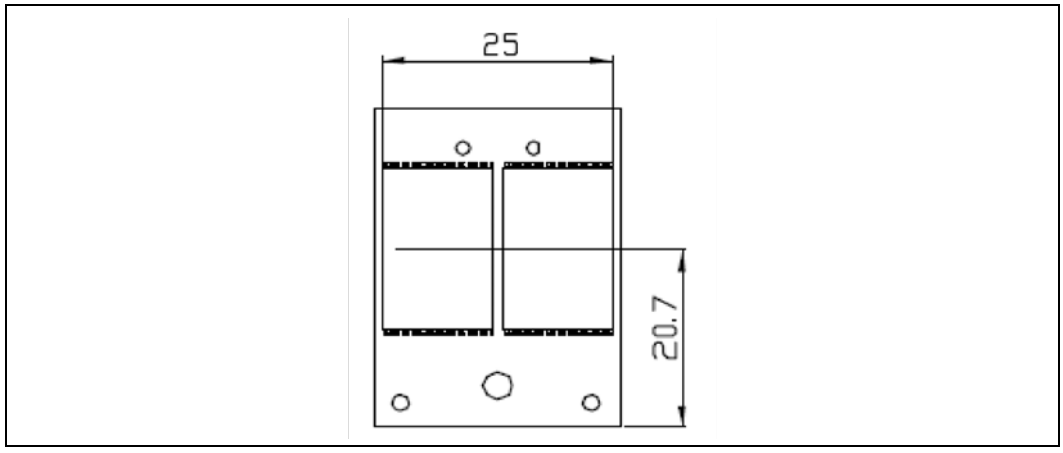
Following are motherboard connector suggestions for the low profile and standard profile version. These are suggestions of parts that are compatible with the Intel® Z-U130 Value Solid State Drive, but it is not limited to these connectors only.

- Standard Profile
  - Amtek - PH1M25-205GBCOR600M1 (#9)-U (Surface Mount)
  - SAMTEC - HTSW-105-07-LM-D-009 (Through Hole)
- Low Profile
  - SAMTEC - MTMM-105-03-SM-D-126-009 (Through Hole)
  - SAMTEC - TMM-105-01-SM-D-SM-009-P-TR (Surface Mount)

Following are standoff suggestions that can be used to secure the screw through the mounting hole. These are suggestions of parts that are compatible with the Intel Z-U130 Value Solid State Drive, but it is not limited to these connectors only.

- Standard Profile
  - Manufacturer: RAF Electronic Hardware
  - Dimensions: 4.5 mm x 9 mm x M2.5 thd
  - Part# M2104-2545-SS
- Low Profile
  - Manufacturer: RAF Electronic Hardware
  - Dimensions: 4.5 mm x 5 mm x M2.5 thd
  - Part# M2100-2545-SS

Figure 4. Standard Profile Mechanicals - Top View



Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm.

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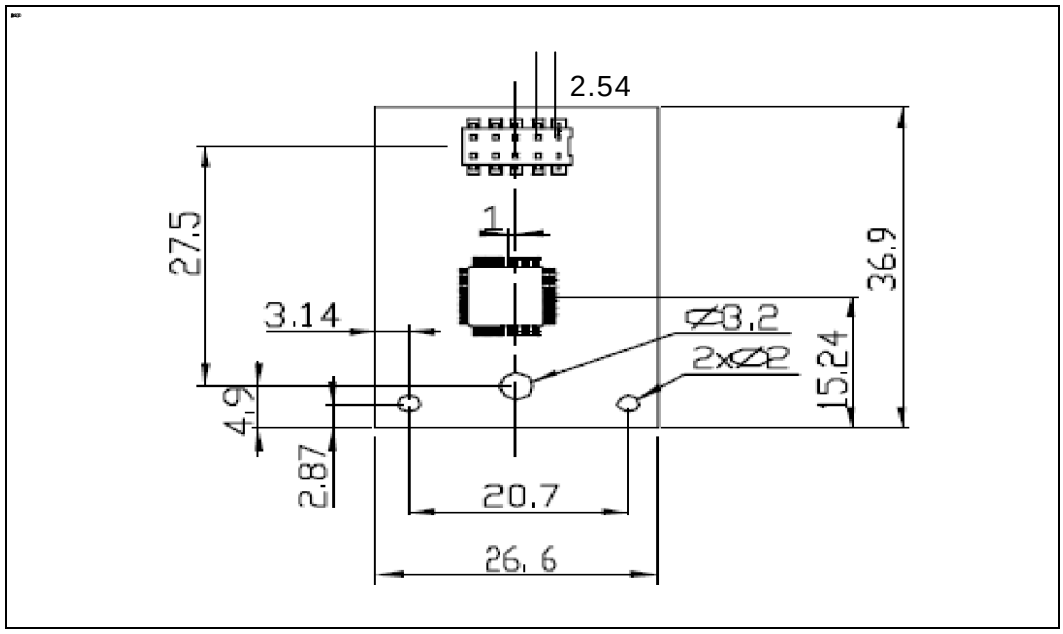
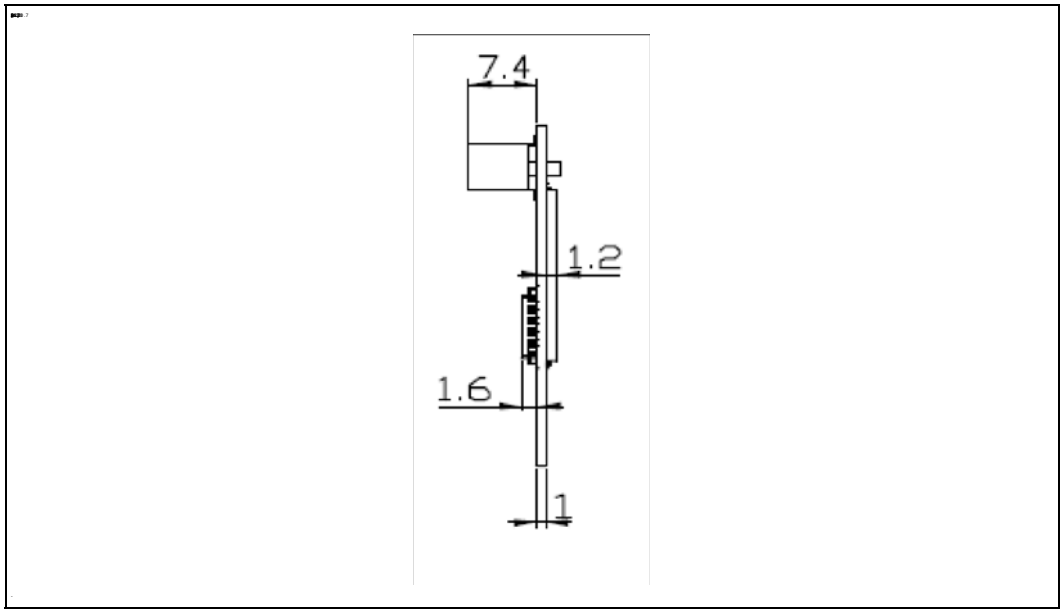
Figure 5. Standard Profile Mechanicals - Bottom View



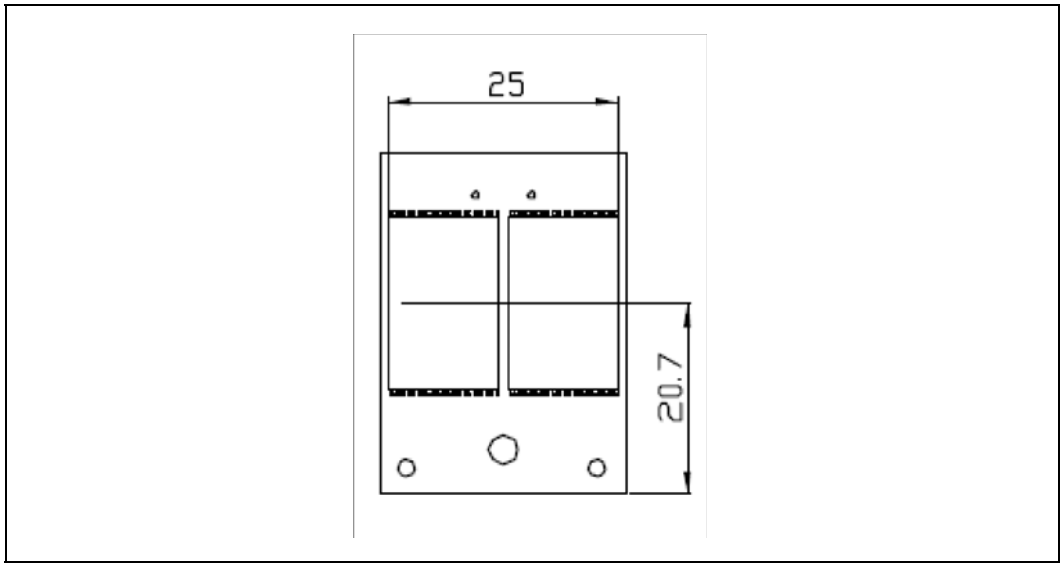
Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm.

Figure 6. Standard Profile Mechanicals - Side View



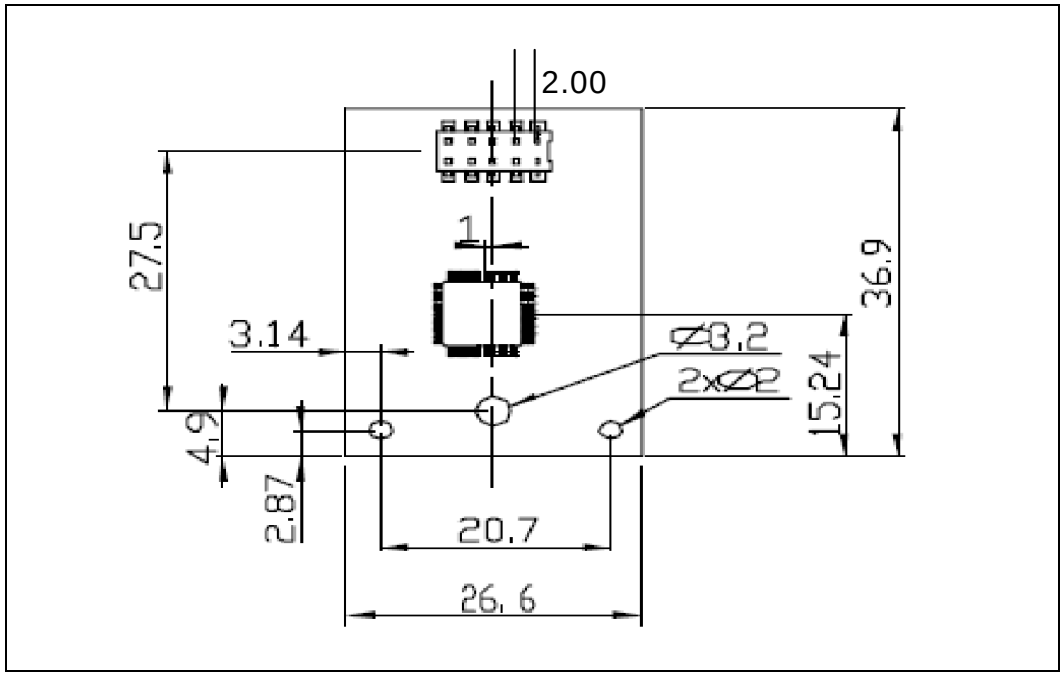
Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm.
3. Standard Profile connector on the module is Pinrex Technology 615-92-05GBB8.

Figure 7. Low Profile Mechanicals - Top View



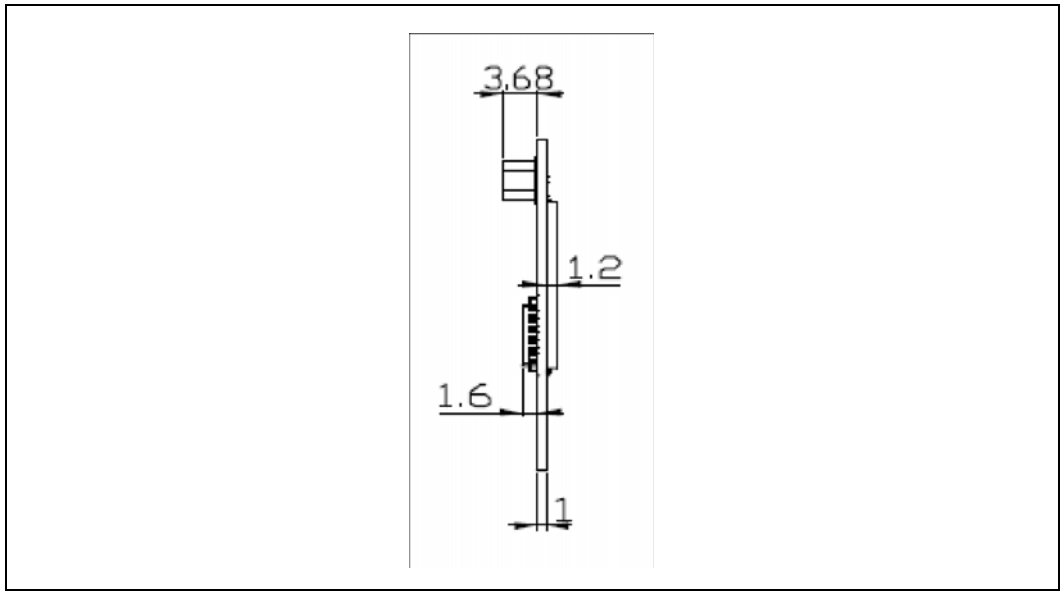
Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm.

Figure 8. Low Profile Mechanicals - Bottom View



Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm.

Figure 9. Low Profile Mechanicals - Side View



Notes:
1. All dimensions are in millimeters.
2. Tolerance on all dimensions is +/- 0.25 mm
3. Low Profile connector on the module is Samtec SMM-105-02-SM-D-09-P-TR.

4.0 Electrical Characteristics

Table 2. Absolute Maximum Ratings by Device

Parameter/Condition	Symbol	Min	Max	Unit
VCC supply voltage	VCC	4.4	5.25	V
Storage temperature	TSTG	–65	+150	°C

Note: Voltage on any pin relative to VSS.

Caution: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating ***only***, and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not guaranteed. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Table 3. Recommended Operating Conditions

Parameter/Condition	Symbol	Min	Typ	Max	Unit
Operating temperature	TA	0	–	+70	°C
VCC supply voltage	Vcc	4.75	5.00	5.25	V
Ground Supply voltage	Vss	0	0	0	V

Table 4. Z-U130 Value SSD Device DC and Operating Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Idle current*	ISB	–	65	TBD	mA	VCC = 5.0V
Active current*	Icc1	–	80	TBD	mA	
Idle Power*	Psb	–	325	TBD	mW	
Active Power*	Pact	–	400	TBD	mW	

Note: Sampled, not tested.

5.0 Ordering Information

Figure 10, "Decoder" on page 14 provides the device part number decoder and Table 5, "Intel Z-U130 Value Solid State Drive Ordering Information" on page 14 provides the available combinations. For combinations not listed, please contact your local Intel sales office.

Figure 10. Decoder

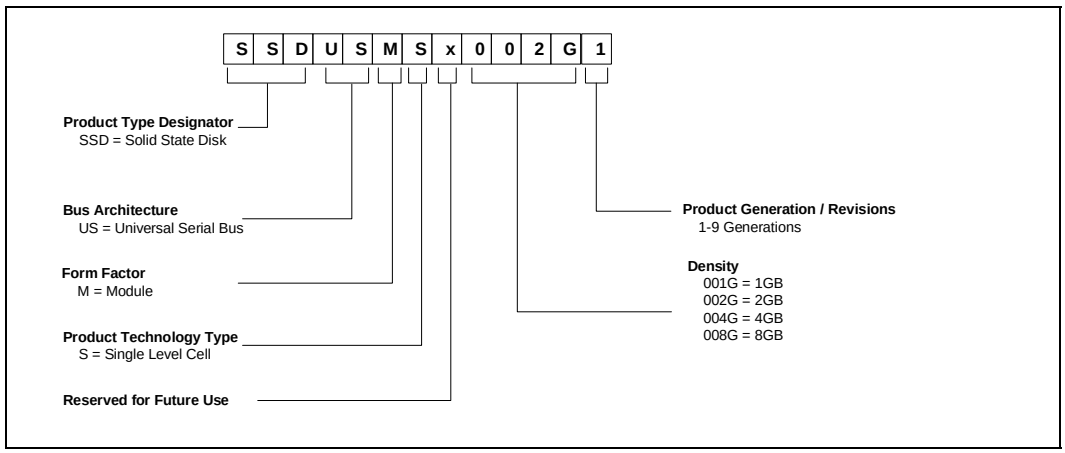


Table 5. Intel Z-U130 Value Solid State Drive Ordering Information

Part Number	MM #	Device Nomenclature	Shipment Packaging
SSDUSMS0001G1	888492	1GB Module - Standard Connector	100 Piece Packaging
SSDUSMS0001GL	890288	1GB Module - Low Profile Connector	
SSDUSMS0002G1	888493	2GB Module - Standard Connector	
SSDUSMS0002GL	890289	2GB Module - Low Profile Connector	
SSDUSMS0004G1	888522	4GB Module - Standard Connector	
SSDUSMS0004GL	890287	4GB Module - Low Profile Connector	
SSDUSMS0001G110	890946	1GB Module - Standard Connector	10 Piece Packaging
SSDUSMS0001GL10	890945	1GB Module - Low Profile Connector	
SSDUSMS0002G110	890944	2GB Module - Standard Connector	
SSDUSMS0002GL10	890943	2GB Module - Low Profile Connector	
SSDUSMS0004G110	890942	4GB Module - Standard Connector	
SSDUSMS0004GL10	890941	4GB Module - Low Profile Connector	