

UD info Corp.

Industrial USB Flash Module

MDU-UD Series

Product DataSheet

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Specifications are subject to change without prior notice.

UD info CORP.

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Revision History

Revision	Draft Date	History	Author
1.0	2014/5/30	New release	Golden Lee
1.1	2017/4/11	Add foolproof pin	Golden Lee



Product Overview

- **Capacity**
 - SLC: 1GB up to 32GB
 - MLC: 4GB up to 64GB
 - pSLC: 2GB up to 32GB
- **Flash Interface**
 - Flash Type: SLC,MLC and pSLC
- **Performance**
 - Read: up to 30 MB/s
 - Write: up to 25 MB/s
- **Power Consumption^{Note1}**
 - Max R/W: 94mA / 136mA
 - Idle mode: < 48mA
- **Advanced Flash Management**
 - Wear Leveling
 - Bad Block Management
 - ECC
 - Pseudo SLC
- **Temperature Range**
 - Operation (Standard): 0°C ~ 70°C
 - Operation (Wide): -40°C ~ 85°C
 - Storage: -40°C ~ 85°C
- **Compliant**
 - RoHS
 - CE & FCC

Notes:

1. Please see "Power Consumption" for details.



1. INTRODUCTION



1.1. General Description

The MDU (Micro Disk USB Flash Module) supports USB 2.0 and 1.1 interfaces to the NAND flash memory. This USB Flash Module is specially designed for motherboard and built-in to the PC/Notebook/IA system. By using this UFM solution, it will reduce a lot of efforts which was needed from R/D to production, as well as simplifying the RMA problems. It supports USB Mass Storage function and supports for USB boot function from BIOS. This solution provides not only easy to install, but also fast, easy to use and low cost way for user.

2. PRODUCT SPECIFICATIONS



- **Capacity**
 - SLC: 1GB up to 32GB
 - MLC: 4GB up to 64GB
 - Pseudo SLC: 2GB up to 32GB
- **Compatible with USB specification revision 1.1 and 2.0.**
- **Support Windows 2000 SP4 and Windows XP without device driver.**
- **Support Windows Vista and Windows 7 without device driver.**
- **Support MAC OS X and later without device driver (USB 1.1 speed).**
- **Support Linux Kernel ver 2.4.0 or above without device driver (USB 1.1 speed).**
- **Support Linux Kernel ver 2.4.10 or above without device driver (USB 2.0 speed).**
- **Durable solid-state storage – data retention up to ten years.**
- **No external power is required – DC 4.5V – 5.5V from USB port.**
- **Transfer rate for USB interface:**
 - High speed up to 480Mbits/sec for USB 2.0.
 - Full speed up to 12Mbits/sec for USB 1.1.
- **Low power consumption.**

3. ENVIRONMENTAL SPECIFICATIONS



3.1. Environmental Conditions

Temperature and Humidity

- Storage Temperature Range
 - -40°C ~ 85°C
- Operation Temperature Range
 - Standard: 0°C ~ 70°C
 - Wide: -40°C ~ 85°C
- Humidity:
 - Standard: RH 93% under 40°C (in operation)
 - Wide: RH 95% under 55°C (in operation)

	Temperature	Humidity	Test Time
Operation (Standard)	70°C	0% RH	72 hours
Storage (Standard)	85°C	0% RH	72 hours
Operation (Wide)	85°C	0% RH	72 hours
Storage (Wide)	85°C	0% RH	168 hours

Result: No any abnormality is detected.

	Temperature	Humidity	Test Time
Operation (Standard)	0°C	0% RH	72 hours
Storage (Standard)	-40°C	0% RH	72 hours
Operation (Wide)	-40°C	0% RH	72 hours
Storage (Wide)	-40°C	0% RH	168 hours

Result: No any abnormality is detected.

	Temperature	Humidity	Test Time
Operation (Standard)	40°C	93% RH	24 hours
Storage (Standard)	40°C	95% RH	72 hours
Operation (Wide)	55°C	95% RH	72 hours
Storage (Wide)	55°C	95% RH	96 hours

Result: No any abnormality is detected.

	Temperature	Test Time	Cycle
Operation (Standard)	0°C	30 min	10 Cycles

	70°C	30 min	
Storage (Standard)	-40°C	30 min	10 Cycles
	85°C	30 min	
Operation (Wide)	-40°C	30 min	20 Cycles
	85°C	30 min	
Storage (Wide)	-40°C	30 min	50 Cycles
	85°C	30 min	

Result: No any abnormality is detected.

Shock

	Acceleration Force	Half Sin Pulse Duration
Non-operational	1500G	0.5ms

Result: No any abnormality is detected when power on.

Vibration

	Condition		Vibration Orientation
	Frequency/Displacement	Frequency/Acceleration	
Non-operational	20Hz~80Hz/1.52mm	80Hz~2000Hz/20G	X, Y, Z axis/30 min for each

Result: No any abnormality is detected when power on.

Drop

	Height of Drop	Number of Drop
Non-operational	110cm free fall	6 face of each unit

Result: No any abnormality is detected when power on.

Bending

	Force	Action
Non-operational	≥ 10N	Hold 1min/5times

Result: No any abnormality is detected when power on.

Torque

	Force	Action
Non-operational	0.5N-m or 5 deg	Hold 5min/5times

Result: No any abnormality is detected when power on.

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Electrostatic Discharge (ESD)

Device	Capacity	Temperature	Relative Humidity	+/- 4KV	Result
USB Module	64GB	24.0°C	49% (RH)	Device functions are affected, but EUT will be back to its normal or operational state automatically.	PASS

3.2. Certification

- RoHS
- CE / FCC



4. ELECTRICAL SPECIFICATIONS



4.1. Absolute Maximum Rating

Item	Symbol	Parameter	MIN	MAX	Unit
1	VDD-VSS	DC Power Supply	-0.3	+5.5	V
2	VIN	Input Voltage	VSS-0.3	VDD+0.3	V
3	Ta	Operating Temperature	0	+70	°C
4	Tst	Storage Temperature	-25	+85	°C

Parameter	Symbol	Min	Typ	MAX	Unit
Operating Temperature	Ta	0	+25	+70	°C
VDD Voltage	VDD	3.0	3.3	3.6	V
		4.5	5.0	5.5	V

4.2. Power Consumption

Read (max.)	Write (max.)	Idle (max.)	Standby (max.)
94	136	48	2

Unit: mW

NOTES:

1. Samples are made of Toshiba NAND Flash.
2. Power Consumption may vary from flash configuration, DDR configuration, or platform.

4.3. DC Characteristic

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
V _{CK}	Core Power Supply	Core Area	1.16	1.23	1.30	V
V _{CC3IO}	Power Supply	3.3V I/O	3.15	3.30	3.45	V
Temp	Junction Temperature		-40	25	125	°C
V _t	Switching threshold	LVTTL		1.5		V
V _{t-}	Schmitt Trigger Negative Going threshold voltage	LVTTL	0.8	1.1		V
V _{t+}	Schmitt Trigger Positive Going threshold voltage			1.6	2.0	V
V _{ol}	Output Low voltage	I _{ol} = 2 ~ 16 mA			0.4	V
V _{oh}	Output High voltage	I _{oh} = 2 ~ 16 mA	V _{CC3IO} - 0.4			V
R _{pu}	Input Pull-Up Resistance	PU=high, PD=low	40	75	190	KΩ
R _{pd}	Input Pull-Down Resistance	PU=low, PD=high	40	75	190	KΩ
I _{in}	Input Leakage Current	V _{in} = V _{CC3I} or 0			10	μA
I _{oz}	Tri-state Output Leakage Current		-10	±1	10	μA

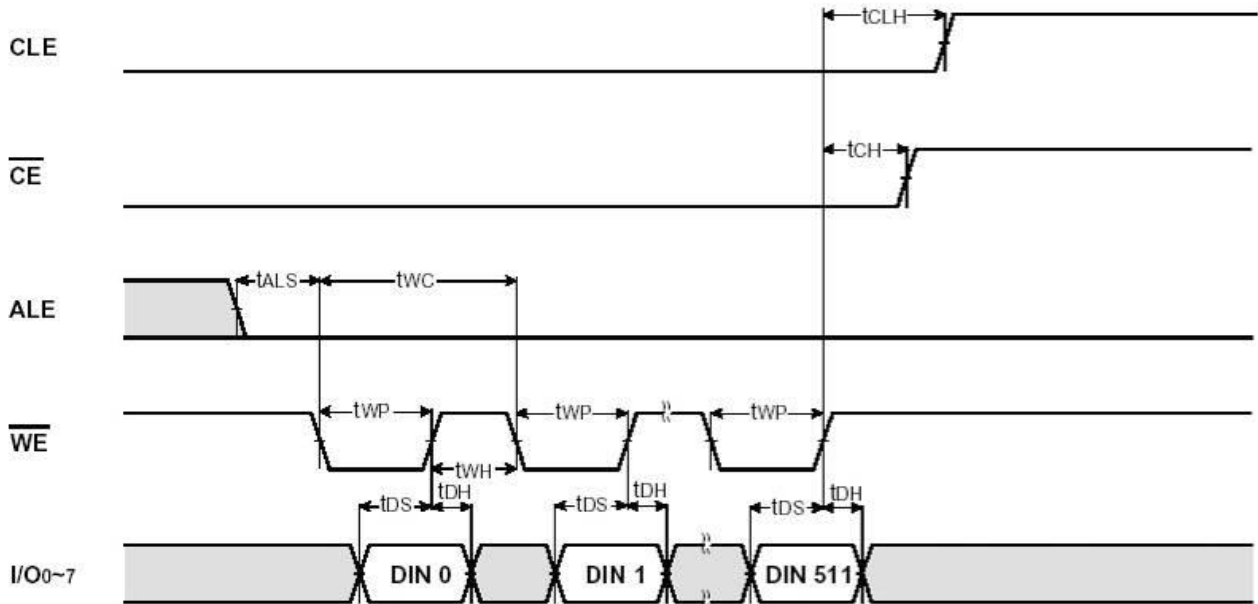
4.4. AC Characteristic

4.4.1. Flash Memory Interface Timing

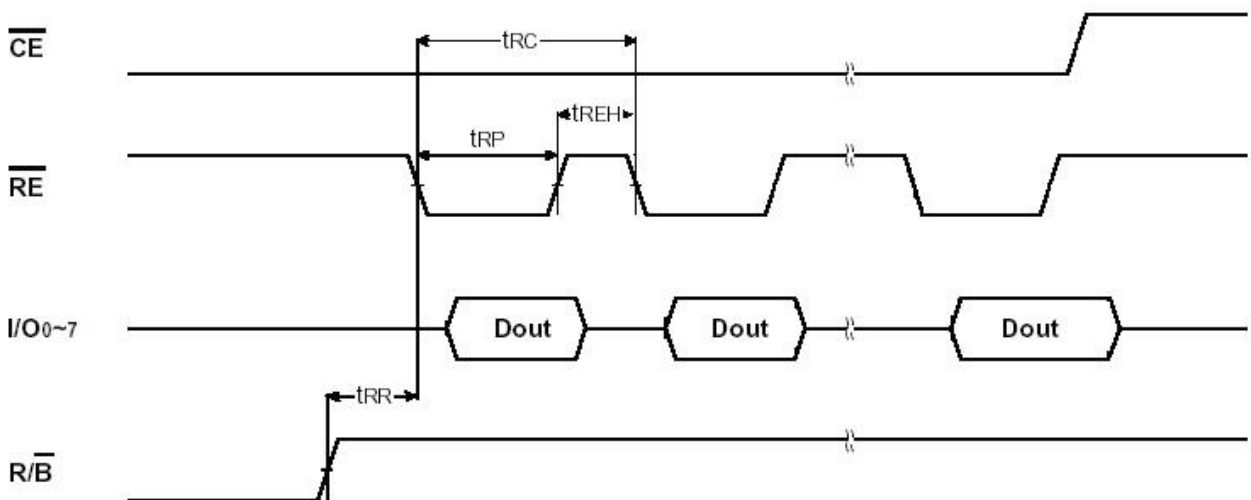
Below information are for reference and example use only. The actual timing, please refer to the related flash spec.

Parameter	Symbol	Min	Max	Unit
CLE Set-up Time	tCLS	0	-	ns
CLE Hold Time	tCLH	10	-	ns
CE Setup Time	tCS	0	-	ns
CE Hold Time	tCH	10	-	ns
WE Pulse Width	tWP	25	-	ns
ALE Setup Time	tALS	0	-	ns
ALE Hold Time	tALH	10	-	ns
Data Setup Time	tDS	20	-	ns
Data Hold Time	tDH	10	-	ns
Write Cycle Time	tWC	45	-	ns
WE High Hold Time	tWH	15	-	ns
Read Cycle Time	tRC	50	-	ns
/RE Pulse Width	tRP	25	-	ns
/RE High Hold Time	tREH	15	-	ns
Ready to /RE Low	tRR	60	-	ns

4.4.4. Input Data Latch Cycle



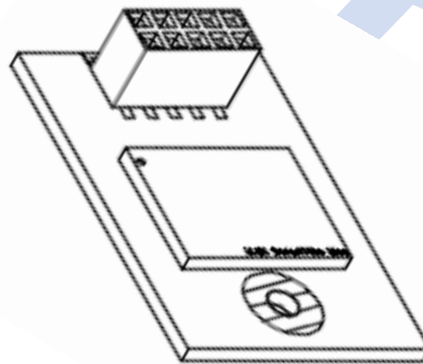
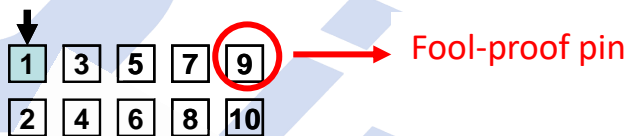
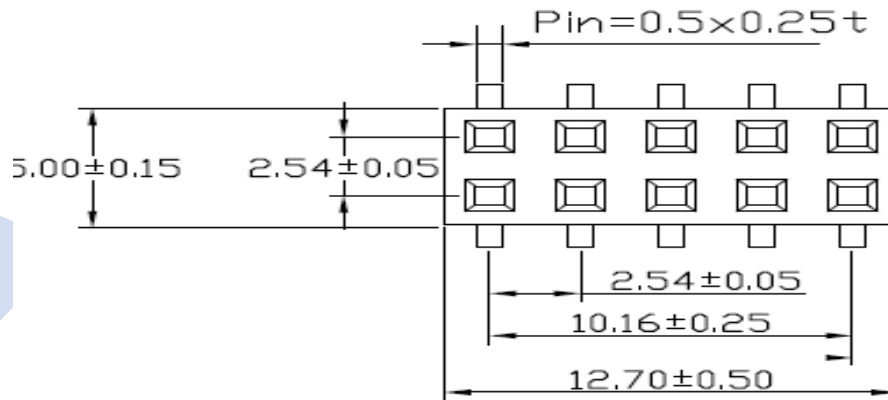
4.4.5. Sequential Out Cycle after Read (CLE=L, /WE=H, ALE=L)



5. INTERFACE



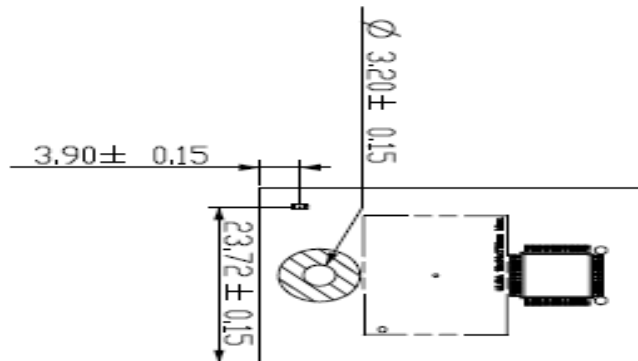
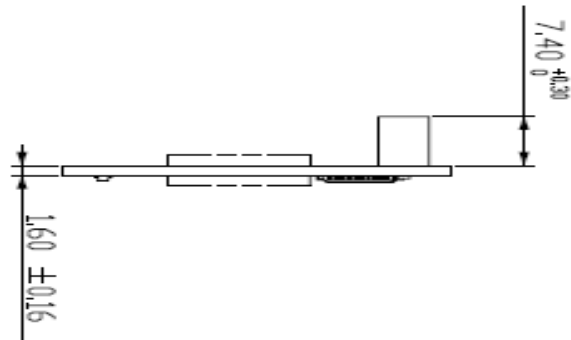
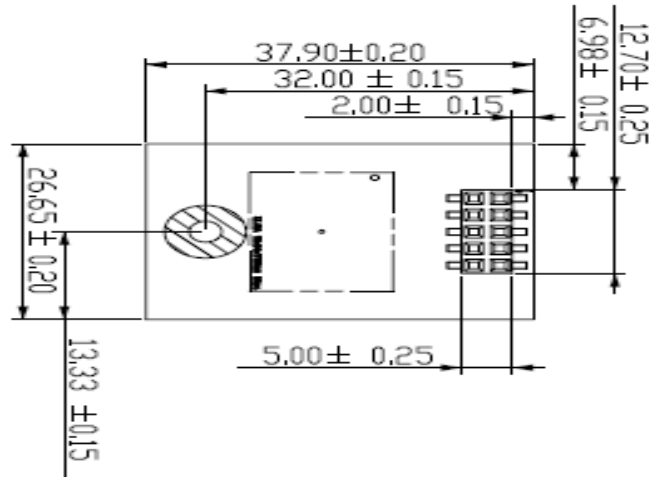
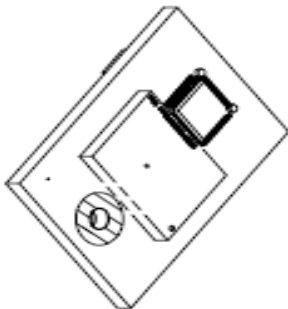
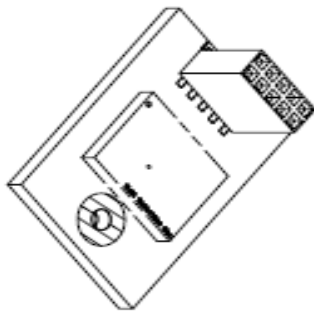
5.1. USB Pin Header Size & Defines – 10 pins



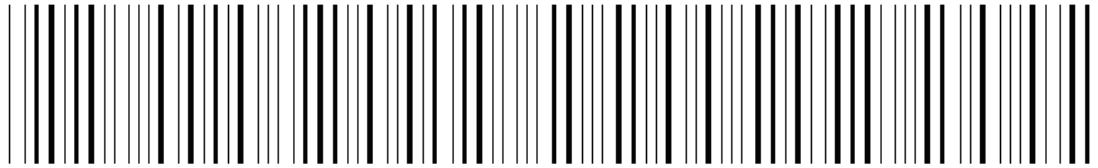
5.2. USB Pin Header Description – 10 pins

USB Pin Header Description – Type D		
No.	Pin Name	Pin Description
1	VCC	5.0V USB Bus Power Input
2	NC	Not Connection
3	DM	USB 2.0 data in negative pin terminal.
4	NC	Not Connection
5	DP	USB 2.0 data in positive pin terminal.
6	NC	Not Connection
7	GND	0V regulator ground reference input.
8	NC	Not Connection
9	NC	Not Connection (Fool-proof)
10	NC	Not Connection

6. PHYSICAL DIMENSION



7. BARCODE DESCRIPTION



M D U 0 L U D 0 6 4 G B C F P



8. PARTNUMBER DECODER

MDU-0LUDX⁸X⁹X¹⁰X¹¹X¹² X¹³ X¹⁴ X¹⁵

X ¹ X ² X ³	X ⁴ X ⁵	X ⁶ X ⁷	X ⁸ X ⁹ X ¹⁰ X ¹¹ X ¹²	X ¹³	X ¹⁴	X ¹⁵
MDU	0L	UD	001GB 002GB 004GB 008GB 016GB 032GB 064GB	C: SLC (0°C~+70°C) I: SLC (-40°C~+85°C) K: MLC (0°C~+70°C) M: MLC (-40°C~+85°C) P: pSLC (0°C~+70°C) F: pSLC (-40°C~+85°C)	F: Fix R: Removable	P