

# UD info Corp.

## Industrial USB Flash Module MDU-0VUA / MDU-0UUA Series Product DataSheet

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***UD info CORP.***

3F-4, No.8, Ln. 609, Sec. 5, Chongxin Rd., Sanchong Dist., New Taipei City 241, Taiwan (R.O.C.)

TEL: +886-2-7713-6050 FAX: +886-2-8511-3151

E-mail: [sales@UDinfo.com.tw](mailto:sales@UDinfo.com.tw)

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## Revision History

Revision	Draft Date	History	Author
1.0	2020/2/11	New release	Golden Lee



## Product Overview

- **Capacity**
  - SLC: 1GB up to 8GB
  - MLC: 8GB up to 64GB
- **Flash Interface**
  - Flash Type: SLC, MLC
- **Performance**
  - Read: up to 35 MB/s
  - Write: up to 35 MB/s
- **Power Consumption**
  - Active mode: 450mW
  - Idle mode: 300mW
- **Advanced Flash Management**
  - Wear Leveling
  - Bad Block Management
  - ECC
- **Temperature Range**
  - Operation (Standard): 0°C ~ 70°C
  - Operation (Wide): -40°C ~ 85°C
  - Storage: -40°C ~ 85°C
- **Compliant**
  - RoHS
  - CE & FCC



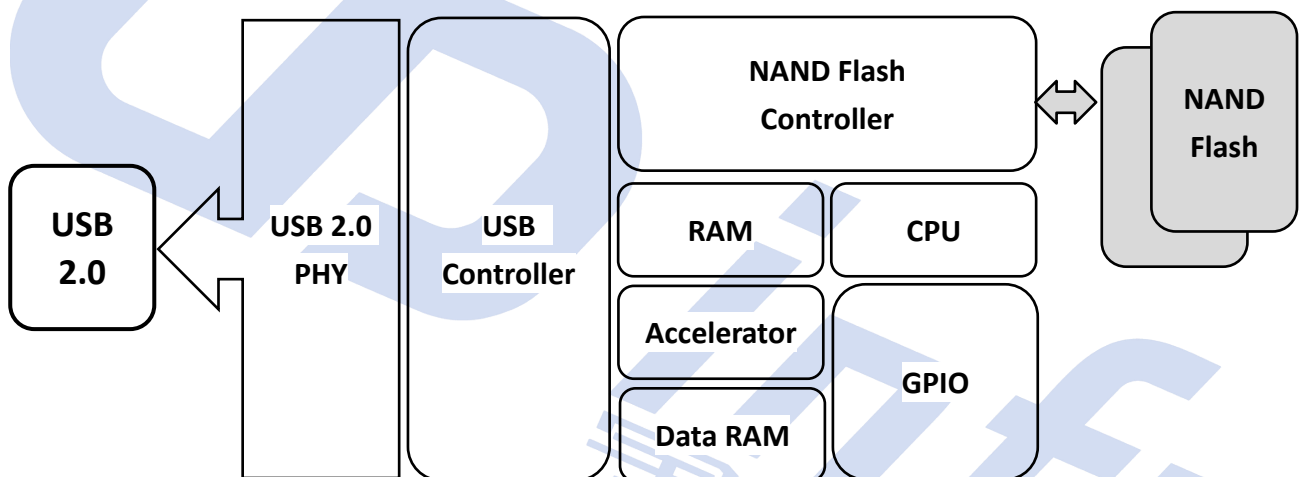
## 1. INTRODUCTION



### 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. 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.

### 1.2. Block Diagram



## 2. PRODUCT SPECIFICATIONS



- **Capacity**
  - SLC: 1GB up to 8GB
  - MLC: 8GB up to 64GB
- **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.
- **Transfer rate for USB interface:**

- Performance

- SLC:

Capacity	Flash Structure	Flash Type	Sequential	
			Read (MB/s)	Write (MB/s)
1GB	1GB x 1	24nm, TSOP	30	20
2GB	2GB x 1	32nm, TSOP	30	25
4GB	4GB x 1	24nm, TSOP	35	30
8GB	8GB x 1	24nm, TSOP	35	35

- MLC:

Capacity	Flash Structure	Flash Type	Sequential	
			Read (MB/s)	Write (MB/s)
8GB	8GB x 1	15nm, TSOP	35	25
16GB	16GB x 1	15nm, TSOP	35	25
32GB	32GB x 1	15nm, BGA	35	30
64GB	64GB x 1	15nm, BGA	35	35

### 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
<b>Non-operational</b>	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
<b>Non-operational</b>	110cm free fall	6 face of each unit

**Result:** No any abnormality is detected when power on.

**Bending**

	Force	Action
<b>Non-operational</b>	≥ 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.

**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.)
450	450	300

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

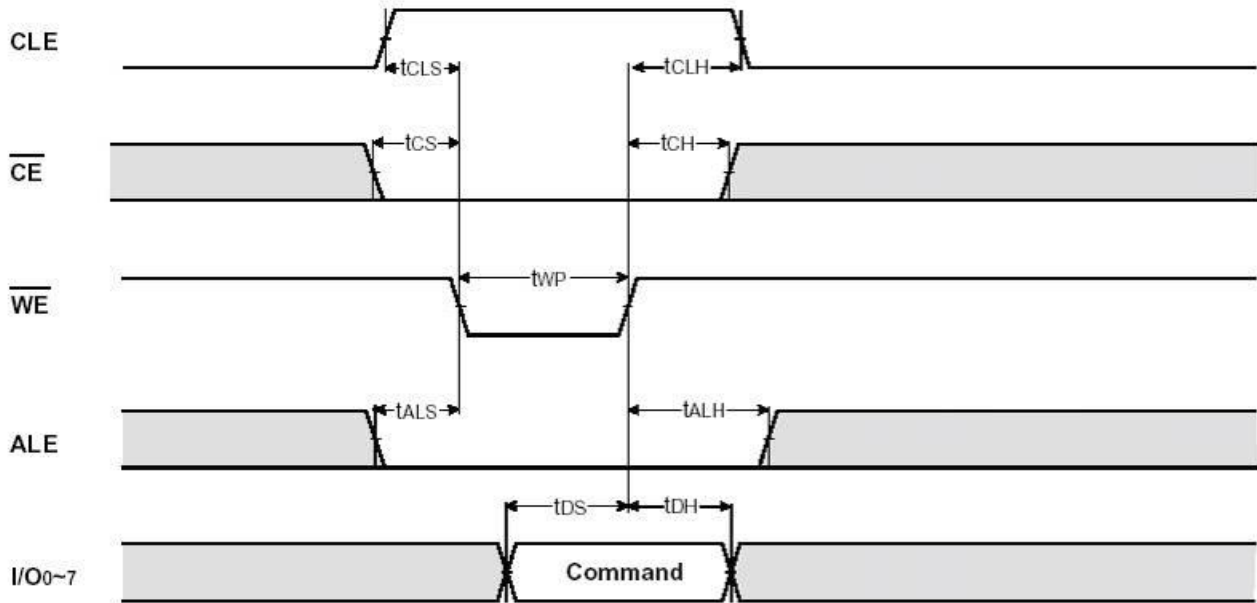
## 4.4. AC Characteristic

### 4.4.1. Flash Memory Interface Timing

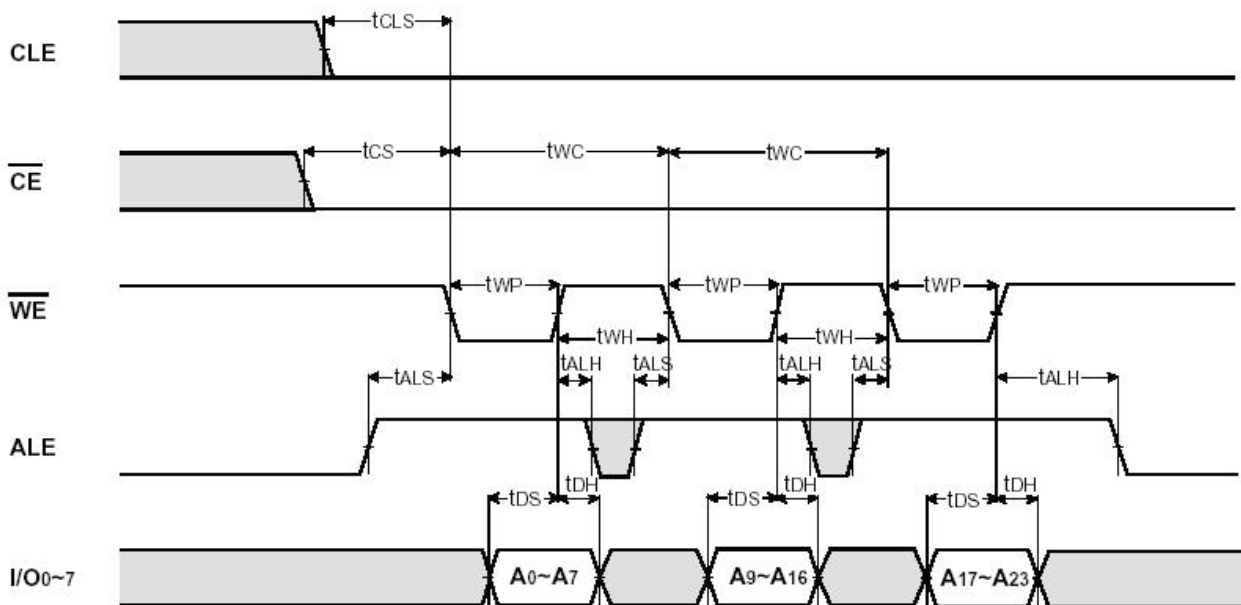
Below information are for reference and example use only. The actual timing, please refer to the related flash spec.

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

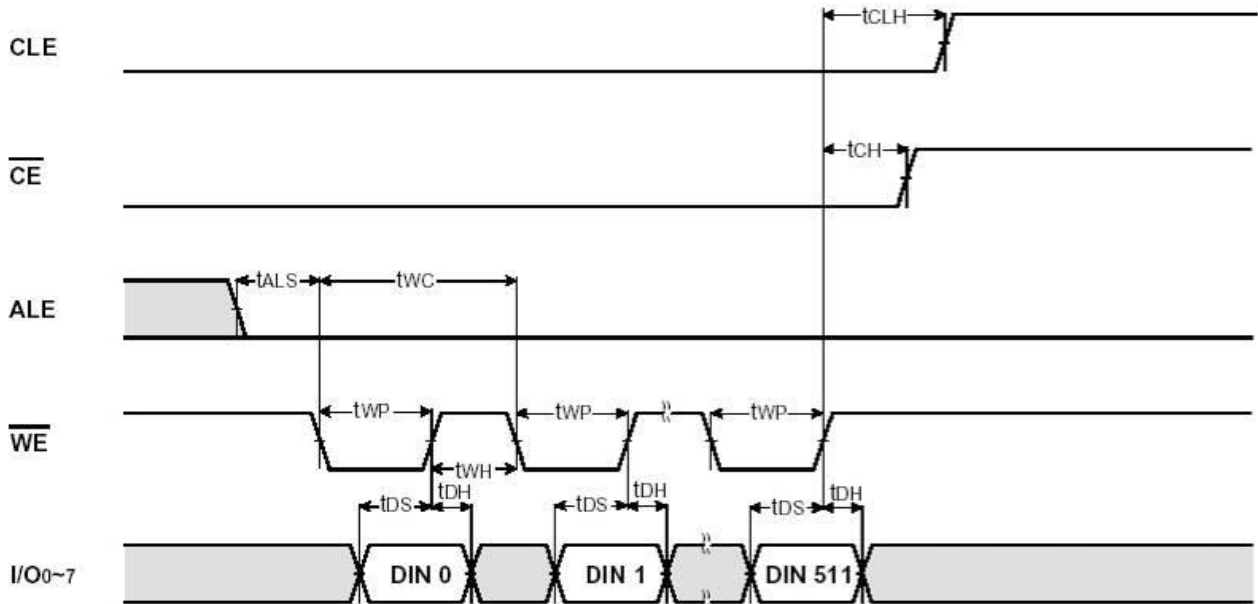
**4.4.2. Command Latch Cycle**



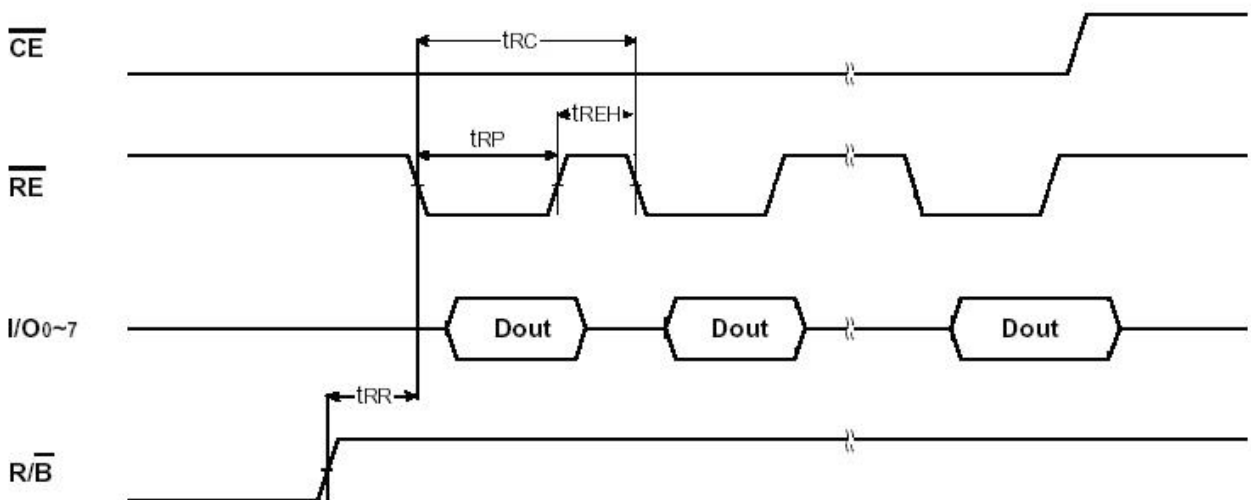
**4.4.3. Address Latch Cycle**



**4.4.4. Input Data Latch Cycle**



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



## 5. INTERFACE

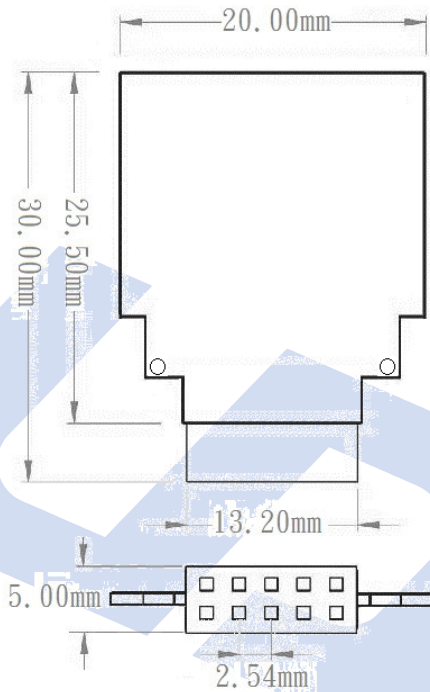


### 5.1. USB Pin Header Description – 10 pins

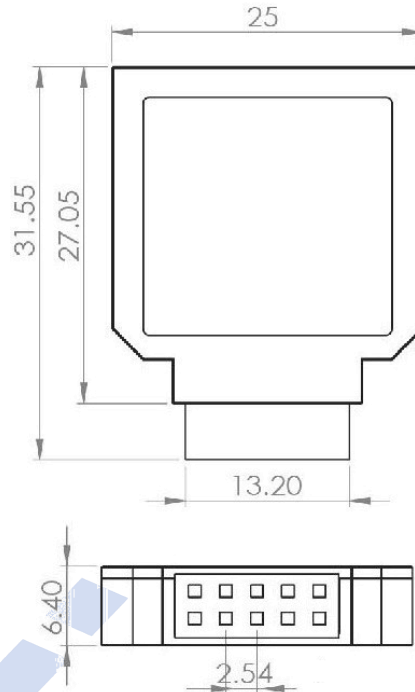
USB Pin Header Description – Type D		
No.	Pin Name	Pin Description
1	VCC	5.0V USB Bus Power Input
2	NC	Not Connection
3	DM	USB 2.0 data in negative pin terminal.
4	NC	Not Connection
5	DP	USB 2.0 data in positive pin terminal.
6	NC	Not Connection
7	GND	0V regulator ground reference input.
8	NC	Not Connection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



**6. PHYSICAL DIMENSION**

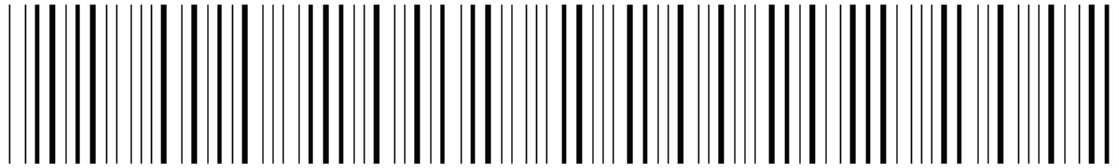


**Without Housing**



**With Housing**

## 7. BARCODE DESCRIPTION



M D U 0 V U A 0 0 1 G B C F U



## 8. PARTNUMBER DECODER



MDU-xxUAX<sup>8</sup>X<sup>9</sup>X<sup>10</sup>X<sup>11</sup>X<sup>12</sup>X<sup>13</sup>X<sup>14</sup>X<sup>15</sup>

X <sup>1</sup> X <sup>2</sup> X <sup>3</sup>	X <sup>4</sup> X <sup>5</sup>	X <sup>6</sup> X <sup>7</sup>	X <sup>8</sup> X <sup>9</sup> X <sup>10</sup> X <sup>11</sup> X <sup>12</sup>	X <sup>13</sup>	X <sup>14</sup>	X <sup>15</sup>
MDU	0V: Without housing 0U: With housing	UA	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)	F: Fix R: Removable	U