# Technical Specifications and Register Map For

mLink Matrix 4x4 Keypad (HCMODU0188)

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# **Specifications**

#### Module specifications:

Module code: HCMODU0188
Supply voltage (VDD): 3.3V to 5.5V
Operating range (recommended): -5 to 105oC

Keypad type: 16 key matrix tactile keypad in 4x4 arrangement

Current consumption (idle): 4.5mA
Interfaces: 12C, Keypad

I2C Interface speed: 400kbits/s (fast mode)

I2C default address (HEX): 0h55

Maximum number of modules: 5 with pullups fitted, 112 with pullups removed\*

Module dimensions (inc headers): 46mm x 14mm x 11mm Keypad dimensions (inc module): 68.5mm x 65mm x 17mm

\*Note the maximum number of connected modules will depend on cable lengths and power requirements of each module. Do not exceed 5 mLink modules connected in series with all pullups fitted.

# **Register Map**

# Register quick reference table

REGISTER	REG ADD	Reg Bit 7	Reg Bit 6	Reg Bit 5	Reg Bit 4	Reg Bit 3	Reg Bit 2	Reg Bit 1	Reg Bit 0	
STATUS	0h00			RESERVED BUSY REGERR						
I2C ADD (Def = 0h51)	0h01	NA		I2CADD						
MODULE TYPE	0h02				0h	01				
MODULE SUBTYPE	0h03				0h	00				
FIRMWARE VERSION	0h04				0h.	xx				
SLEEP	0h05				RESERVED				SLEEPEN	
RESERVED	0h06 to 0h0A				RESE	RVED				
KEY	0h0B				KEY	[7:0]				
KEY STATE	0h0C			RESERVED KEYDOW						
DEBOUNCE	0h0D	NA				DEBOUNCE[6:0]				

#### Status register

Register address: 0h00

Default value: 0

7	6	5	4	3	2	1	0
		RESERVED			BUSY	REGERR	I2CERR
		r	r	rw	rw		

Bits 7:3 Reserved

Bit 2 BUSY: Busy status

This bit is set and reset by hardware

0: Measurement ready

1: Measurement in progress

Bit 1 **REGERR**: Register access error

This bit is set by hardware and reset by software

0: No register access error

1: Register access error caused by attempting to access an non-existent register, writing an illegal value to a register, or writing to a read only register

Bit 0 I2CERR: I2C bus access error

This bit is set by hardware and reset by software

0: No I2C error

1: An I2C bus error has occurred

Writing any value to this register will clear all bits

#### **I2C Address Register**

Register address: 0h01 Default value: 0h54

7	6	5	4	3	2	1	0
N/A				I2CADD			
r				rw			

Bit 7 N/A: Returns 0

Bits 6:0 **I2CADD**: 7 bit I2C address (default factory reset value = 0h54)

These bits are set by software

Values written to this register will be stored in non-volatile memory

Valid address range is 0h08 to 0h77. Addresses outside this range will be ignored but will set the **REGERR** bit in the status register.

Before a new address can be written to this register it must first be unlocked by writing bytes 0x55 followed by 0xAA. The new address byte must then be written within 100ms of writing the 0xAA byted otherwise the unlock process will timeout and reset.

#### **Module Type Register**

Register address: 0h02 Default value: 0h04

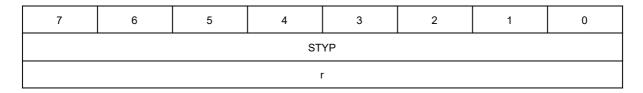
7	6	5	4	3	2	1	0	
MTYP								
			ı	r				

Bits 7:0 MTYP: 8 bit value representing the module type.

This register will always return 0h04 signifying this module type is 'Input'

### **Module Subtype Register**

Register address: 0h03 Default value: 0h00



Bits 7:0 **STYP**: 8 bit value representing the module subtype.

This register will always return 0h00 signifying this module subtype is 'NTC'

# Firmware Version Register

Register address: 0h04 Default value: 0hXX

7	6	5	4	3	2	1	0
	FWI	MAV			FWMIV		
	r				ı	r	

Bits 7:4 **FWMAV**: 4 bit value representing the modules major firmware version Bits 3:0 **FWMAV**: 4 bit value representing the modules minor firmware version

#### **Sleep Register**

Register address: 0h05 Default value: 0h00

7	6	5	4	3	2	1	0			
	RESERVED									
	W									

Bits 7:1 Reserved

Bit 0 **SLEEPEN**: Sleep enable

This bit is set by software. Writing a 1 to this bit will place the module into low power sleep mode.

1: Enable sleep mode

Sleep mode is excited (SLEEPEN = 0) automatically on the next register read or write. Note: After exiting sleep mode the busy bit in the status register should be polled before reading a new temperature.

## **Key Register**

Register address: 0h0B Default value: 0h00

7	6	5	4	3	2	1	0	
KEY[7:0]								
			-	r				

Bits 7:0 KEY: ASCII value of last key pressed

This register is set and cleared by hardware.

This register stores the last pressed key as an 8 bit ASCII value. If no key is pressed the register will return a value of 0h00

Note that the register is cleared by hardware after a read. Therefore it will return 0h00 on the next read even if the key is still pressed and will not return a new value until the current key is released and a new key is pressed.

If you wish to know if a key is still pressed see register KEY STATE.

# **Key State Register**

Register address: 0h0C Default value: 0h00

7	6	5	4	3	2	1	0		
	RESERVED								
	r								

#### Bit 0 KEYDOWN: Current key state

This register is set and cleared by hardware.

Returns a '1' of any key on the keypad is currently pressed or a '0' if no key is pressed.

## **Key Debounce Register**

Register address: 0h0D Default value: 0h05

7	6	5	4	3	2	1	0		
NA			[	DEBOUNCE[6:0]					
			r	W					

Bit 7 N/A: Returns 0

Bits 6:0 **DEBOUNCE**: Debounce level (default factory reset value = 0h05)

This register is set by software.

Used to set the amount of debouncing used when reading the state of the keypad keys.

Values written to this register will be stored in non-volatile memory.

Valid dbounce range is 0 to 100 (dec). Values outside this range will be set to 100.