Technical Specifications and Register Map For

mLink Matrix 4x4 Keypad (HCMODU0188)

DISCLAIMER

The mLink range is a series of modules intended for the hobbyist and educational markets. Where every care has been taken to ensure the reliability and durability of this product it should not be used in safety or reliability critical applications.

This document is provided "as is". Hobby Components Ltd makes no warranties, whether express, implied or statutory, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose, accuracy or lack of negligence. Hobby Components Ltd shall not, in any circumstances, be liable for any damages, including, but not limited to, special, incidental or consequential damages for any reason whatsoever.

COPYRIGHT NOTICE

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:	I2C, 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	I2CERR
I2C ADD (Def = 0h51)	0h01	NA	I2CADD						
MODULE TYPE	0h02	0h01							
MODULE SUBTYPE	0h03	0h00							
FIRMWARE VERSION	0h04	0hXX							
SLEEP	0h05	RESERVED							SLEEPEN
RESERVED	0h06 to 0h0A	RESERVED							
KEY	0h0B	KEY[7:0]							
KEY STATE	0h0C	RESERVED							KEYDOWN
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							
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

7	6	5	4	3	2	1	0
STYP							
r							

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
FWMAV				FWMIV			
r				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							SLEEPEN
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							KEYDOWN
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]						
rw							

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.