Technical Specifications and Register Map For

mLink 6 Button Pad
(HCMODU0193)

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Specifications

Module specifications:

Module code:	HCMODU0193
Supply voltage (VDD):	3.3V to 5.5V
Operating range (recommended):	-5 to 105oC
Keypad type:	6 button tactile keypad in dpad + back arrangement
Current consumption (idle):	4.5mA
Interfaces:	I2C, Keypad
I2C Interface speed:	400kbits/s (fast mode)
I2C default address (HEX):	0h59
Maximum number of modules:	5 with pullups fitted, 112 with pullups removed*
Module dimensions (inc headers):	59mm x 44mm x 16mm

*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				BUFFFULL	RESERVED	REGERR	I2CERR
I2C ADD (Def = 0h51)	0h01	NA	I2CADD						
MODULE TYPE	0h02	0h04							
MODULE SUBTYPE	0h03	0h01							
FIRMWARE VERSION	0h04	0hXX							
RESERVED	0h05 to 0h09	RESERVED							
BUFFER STATUS	0h0A	RESERVED						FULL	EMPTY
BUTTON BUFFER	0h0B	0h00					KEY		
BUTTON STATUS	0h0C	RESERVED		KEYBACK	KEYSEL	KEYRIGHT	KEYDOWN	KEYLEFT	KEYUP
DEBOUNCE LEVEL	0h0D	DEBOUNCE							

Status register

Register address: 0h00
Default value: 0

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

Bits 7:4 Reserved
Bit 3 **BUFFFULL**: Button pad buffer full error
This bit is set by hardware and reset by software
0: Buffer is not full
1: Buffer is full and one or more additional button presses have been detected therefore additional key presses have been lost.

Bit 2 Reserved

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: 0h57

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 = 0h59)

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 byte otherwise the unlock sequence 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: 0h01

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 0h01 for the 6 button pad.

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

Buffer Status

Register address: 0h0A
Default value: 0h01

7	6	5	4	3	2	1	0
RESERVED						FULL	EMPTY
r							

Bits 7:2 Reserved

Bit 1 **FULL:** Buffer full

This bit is set and reset by hardware.
0: Buffer is not full
1: Buffer is full. Any additional button presses will be ignored. This bit is cleared by reading at least one byte from the BUFFER register.

Bit 0 **EMPTY**: Buffer empty

This bit is set and reset by hardware.
0: Buffer not empty, there is at least one byte stored in the BUFFER register
1: Buffer is empty therefore no button presses are pending in the BUFFER register

Button Buffer

Register address: 0h0B
Default value: 0h00

7	6	5	4	3	2	1	0
0h00					KEY		
r							

Bits 2:0 **KEY**: key code

These bits are set and cleared by hardware.

Stores up to a maximum of 16 button presses. Reading this register will return a byte containing the key code of the first button pressed (since the last time the register was read). Subsequent reads of this register will return keycodes for any additional buttons pressed in the order they were pressed until the buffer is empty.

Key codes returned by reading the buffer register are as follows:

0 = UP KEY
1 = LEFT KEY
2 = DOWN KEY
3 = RIGHT KEY
4 = SELECT KEY
5 = BACK KEY
255 = KEY INVALID

Note: Before reading this register the EMPTY bit in the BUFFER STATUS register must be checked to confirm the buffer contains valid data. Reading the buffer register whilst the buffer is empty (EMPTY = 1) will return an invalid key code of 0xFF.

Button Status

Register address: 0h0C
Default value: 0h00

7	6	5	4	3	2	1	0
RESERVED		KEYBACK	KEYSEL	KEYRIGHT	KEYDOWN	KEYLEFT	KEYUP
r							

Bits 7:6 Reserved

Bit 5 **KEYBACK**: Back key status
This bit is set and reset by hardware.

0: Back key not pressed
1: Back key is currently pressed

Bit 4 **KEYSEL**: Select key status
This bit is set and reset by hardware.

0: Select key not pressed
1: Select key is currently pressed

Bit 3 **KEYRIGHT**: Right key status
This bit is set and reset by hardware.

0: Right key not pressed
1: Right key is currently pressed

Bit 2 **KEYDOWN**: Down key status
This bit is set and reset by hardware.

0: Down key not pressed
1: Down key is currently pressed

Bit 1 **KEYLEFT**: Left key status
This bit is set and reset by hardware.

0: Left key not pressed
1: Left key is currently pressed

Bit 0 **KEYUP**: Up key status
This bit is set and reset by hardware.

0: Up key not pressed
1: Up key is currently pressed

Debounce Level
Register address: 0h0D
Default value: 0hC8

7	6	5	4	3	2	1	0
DEBOUNCE							
rw							

Bits 7:1 Reserved
Bit 7:0 **DEBOUNCE**: Debounce level
These bits are set and reset by software.

Sets the amount of debouncing (default = 200) applied to the buttons where 0 is no debouncing and 254 is maximum.

Dimensions