Technical Specifications and Register Map For

mLink 12 Channel Servo Controller (HCMODU0263)

Version: 1.00

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Specifications

Module specifications:

Module code:	HCMODU0263
Module supply voltage:	4.5V to 5.5V (via mLink header)
Supply current (module only):	4.6mA (normal), ~300uA (sleep)
Number of servo outputs:	12
Servo output type:	PWM
Servo duty cycle:	20ms
Servo PWM on time (min):	10us
Servo PWM on time (max):	2.55ms
Servo step resolution:	10us
Servo interface:	12x 3 pin 0.1" pitch pin header (PWM, 5V, GND)
Servo supply input:	5V @ 5A max via screw terminal
I2C Interface speed:	400kbits/s (fast mode)
I2C default address (HEX):	0h60
Maximum number of modules:	5 with pullups fitted, 112 with pullups removed*
Module dimensions (ex mLink headers):	52mm x 21.5mm x 11.5mm

*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 = 0h5D)	0h01	NA	I2CADD						
MODULE TYPE	0h02	0h06							
MODULE SUBTYPE	0h03	0h01							
FIRMWARE VERSION	0h04	FWMAV				FWMIV			
SLEEP	0h05	RESERVED							SLEEPEN
RESERVED	0h06 to 0h09	RESERVED							
SERVO 0 POSITION	0h0A	S0POS							
SERVO 1 POSITION	0h0B	S1POS							
SERVO 2 POSITION	0h0C	S2POS							
SERVO 3 POSITION	0h0D	S3POS							
SERVO 4 POSITION	0h0E	S4POS							
SERVO 5 POSITION	0h0F	S5POS							
SERVO 6 POSITION	0h10	S6POS							
SERVO 7 POSITION	0h11	S7POS							
SERVO 8 POSITION	0h12	S8POS							
SERVO 9 POSITION	0h13	S9POS							
SERVO 10 POSITION	0h14	S10POS							
SERVO 11 POSITION	0h15	S11POS							
SERVO 0 LIMIT LOW	0h16	S0LIMLOW							
SERVO 1 LIMIT LOW	0h17	S1LIMLOW							
SERVO 2 LIMIT LOW	0h18	S2LIMLOW							
SERVO 3 LIMIT LOW	0h19	S3LIMLOW							
SERVO 4 LIMIT LOW	0h1A	S4LIMLOW							
SERVO 5 LIMIT LOW	0h1B	S5LIMLOW							

SERVO 6 LIMIT LOW	0h1C	S6LIMLOW	
SERVO 7 LIMIT LOW	0h1D	S7LIMLOW	
SERVO 8 LIMIT LOW	0h1E	S8LIMLOW	
SERVO 9 LIMIT LOW	0h1F	S9LIMLOW	
SERVO 10 LIMIT LOW	0h20	S10LIMLOW	
SERVO 11 LIMIT LOW	0h21	S11LIMLOW	
SERVO 0 LIMIT HIGH	0h22	S0LIMHIGH	
SERVO 1 LIMIT HIGH	0h23	S1LIMHIGH	
SERVO 2 LIMIT HIGH	0h24	S2LIMHIGH	
SERVO 3 LIMIT HIGH	0h25	S3LIMHIGH	
SERVO 4 LIMIT HIGH	0h26	S4LIMHIGH	
SERVO 5 LIMIT HIGH	0h27	S5LIMHIGH	
SERVO 6 LIMIT HIGH	0h28	S6LIMHIGH	
SERVO 7 LIMIT HIGH	0h29	S7LIMHIGH	
SERVO 8 LIMIT HIGH	0h2A	S8LIMHIGH	
SERVO 9 LIMIT HIGH	0h2B	S9LIMHIGH	
SERVO 10 LIMIT HIGH	0h2C	S10LIMHIGH	
SERVO 11 LIMIT HIGH	0h2D	S11LIMHIGH	
SERVO ON	0h2E	RESERVED	SONINDEX
SERVO OFF	0h2F	RESERVED	SOFFINDEX
STORE SETTINGS	0h30	RESERVED	STORE

Status register

Register address: 0h00
Default value: 0h00

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

Bits 7:4 Reserved

Bit 2 **BUSY**: Busy status
    This bit is set and reset by hardware
    0: Ready
    1: RM95 write 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: 0h5F

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 = 0h5D)
　　　　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: 0h06

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 0h06, signifying this module type is 'wireless transceiver'

Module Subtype Register

Register address: 0h03
Default value: 0h01

7	6	5	4	3	2	1	0
			ST	YP			
				r			

Bits 7:0 **STYP**: 8 bit value representing the module subtype.
   This register will always return 0h01 for the 12ch servo controller.

Firmware Version Register

Register address: 0h04
Default value: 0hXX

7	6	5	4	3	2	1	0
	FW	MAV			FW	MIV	
		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

Register address: 0h05
Default value: 0h00

7	6	5	4	3	2	1	0
			RESER	VED			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 exited (SLEEPEN = 0) automatically on the next register read or write.

Servo 0…11 Position

Register address: 0h0A to 0h15
Default value: 0h64

7	6	5	4	3	2	1	0
			S[0…11]POS				
			rw				

Bits 7:0 **S[0…11]POS**: Sets the servo position for servos 0 to 11
        This register is set by software.

        Writing a value between 0 and 255 to a register between 0h0A and 0h15 will set the position for the appropriate servo.

The written value will set the on time of the PWM pulse for the appropriate servo in 10us increments. Setting a value of 0 (minimum) will generate a 10us on time, and setting a value of 255 (maximum) will generate a 2.55ms on time.

If a value lower than its servo low limit (see registers 0h16 to 0h21) is written, the servo low limit will be written instead.

If a value higher than its servo high limit (see registers 0h22 to 0h2D) is written, the servo high limit will be written instead.

IMPORTANT: Writing values to this register can produce on times that may push the servo beyond its minimum and maximum range. Operating a servo outside its limits for extended periods can cause permanent damage to the servo.

To prevent this, always refer to your servo's technical specifications and ensure that the values written to this register stay within its safe operating limits.

Servo 0…11 Limit Low

Register address: 0h16 to 0h21
Default value: 0h64

7	6	5	4	3	2	1	0
			S[0…11]LIMLOW				
			rw				

Bits 7:0 **S[0…11]LIMLOW**: Sets the lower servo position limit for servos 0 to 11
This register is set by software.

Sets the lower safe limit for the servos position. Once configured, any value written to the appropriate servo's position register (0x0A to 0x15) that is less than this limit will automatically be adjusted to this lower limit.

These registers ensure the servo cannot be driven below its minimum safe position, preventing accidental damage. Please consult your servos technical specification for the correct timings.

Notes: By default the minimum limit for all servos is set to 0h64 which results in a 1ms minimum on time.

Servo On

Register address: 0h2E
Default value: n/a

7	6	5	4	3	2	1	0
RESERVED				SONINDEX			
w							

Bits 7:0 **SONINDEX**: Enables servo PWM output
This register is set by software.

Writing a value between 0 and 11 to this register activates the corresponding servo's PWM output.

Notes: By default all servo outputs are off, therefore to move a servo to the position specified in its position register, you must enable the PWM output by writing to this register.

Servo Off

Register address: 0h2F
Default value: n/a

7	6	5	4	3	2	1	0
RESERVED				SOFFINDEX			
w							

Bits 7:0 **SOFFINDEX**: Disables servo PWM output
　　　This register is set by software.

　　　Writing a value between 0 and 11 to this register deactivates the corresponding
servo's PWM output.

Store Settings

Register address: 0h30
Default value: n/a

7	6	5	4	3	2	1	0
RESERVED							STORE
r							

Bits 7:1 Reserved
Bit 0 **STORE**: Store settings
　　　This register is set and reset by hardware.

This register saves the configuration for all 12 servos, including:

- Servo positions
- Lower and upper limits
- On/off states

The settings are stored in non-volatile memory and will be applied when the servo controller
is restarted　　.

- Writing 0 saves the **current** settings to non-volatile memory.
- Writing 1 saves the **default** settings to non-volatile memory.