

TI DSP, MCU 및 Xilinx Zynq FPGA 프로그래밍 전문가 과정

- BM5611 -

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BM5611

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1. HALCOGEN 설정

TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1

General Driver Enable R5-MPU-PMU Interrupts VIM General VIM RAM VIM C

Enable Driver Compilation

Click and mark the required modules for driver compilation from below:

☐ Enable RTI driver ☐ Mark/Unmark all drivers

☐ Enable GIO driver **

☒ Enable SCI drivers

☐ Enable SCI3 driver **

☐ Enable SCI4 driver **

☐ Enable LIN drivers

☐ Enable LIN1 driver ** / ☒ Enable SCI1 driver **

☐ Enable LIN2 driver ** / ☒ Enable SCI2 driver **

☐ Enable MIBSPI drivers

☐ Enable MIBSPI1 driver ** ☐ Enable SPI1 driver **

☐ Enable MIBSPI2 driver ** ☐ Enable SPI2 driver **

☐ Enable MIBSPI3 driver ** ☐ Enable SPI3 driver **

☐ Enable MIBSPI4 driver ** ☐ Enable SPI4 driver **

☐ Enable MIBSPI5 driver ** ☐ Enable SPI5 driver **

☐ Enable CAN drivers

☐ Enable CAN1 driver

☐ Enable CAN2 driver

☐ Enable CAN3 driver

☐ Enable CAN4 driver **

☐ Enable ADC drivers

☐ Enable ADC1 driver **

☐ Enable ADC2 driver **

☐ Enable HET drivers

☐ Enable HET1 driver **

☐ Enable HET2 driver **

☒ Enable I2C driver **

☐ Enable I2C1 driver **

☒ Enable I2C2 driver **

☐ Enable EMAC driver **

Enable / Disable Peripherals

<input type="checkbox"/> HET1	<input type="checkbox"/> GIOA	<input type="checkbox"/> MIBSPI2	<input type="checkbox"/> MIBSPI1	<input type="checkbox"/> SCI3	<input type="checkbox"/> RMI
<input type="checkbox"/> HET2	<input type="checkbox"/> GIOB	<input type="checkbox"/> MIBSPI4	<input type="checkbox"/> MIBSPI3	<input type="checkbox"/> SCI4	<input type="checkbox"/> MII
<input type="checkbox"/> EMIF	<input type="checkbox"/> EQEP	<input type="checkbox"/> AD1EVT	<input type="checkbox"/> MIBSPI5	<input type="checkbox"/> LIN2/SCI2	<input type="checkbox"/> CAN4
<input type="checkbox"/> ETPWM	<input type="checkbox"/> ECAP	<input type="checkbox"/> AD2EVT	<input type="checkbox"/> I2C1	<input checked="" type="checkbox"/> I2C2	

Note: GIO pins and alternate functions. MII has RMI and Special.

TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2

I2C Global I2C Clocks I2C Port

Global Config

☒ Enable Master Mode Tx / Rx: TRANSMITTER

Add mode: 7BIT_AMODE Bit Count: 8_BIT ☐ Ignore NACK

Data Count: 8

☐ Enable Repeat Mode (Only in Master Mode) ☐ Enable Free Data Format ☐ Compatibility Mode

NOTE: Stop Condition is generated by the device.

Interrupts

TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2

I2C Global I2C Clocks I2C Port

Data Format

Baudrate: 400 Prescale: 8 Module Clock Frequency: 8

VCLK1 (MHz): 75.0

ICCH: 5

ICCL: 5

2. Register

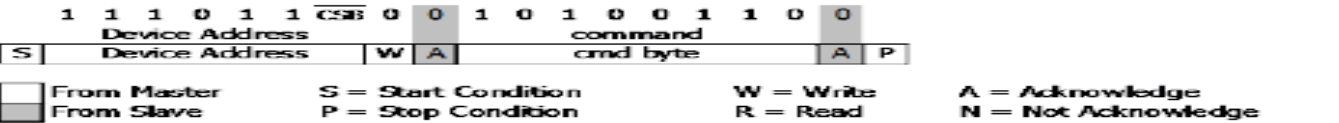


Figure 11: I²C Command to read memory address= 011 (Coefficient 3)

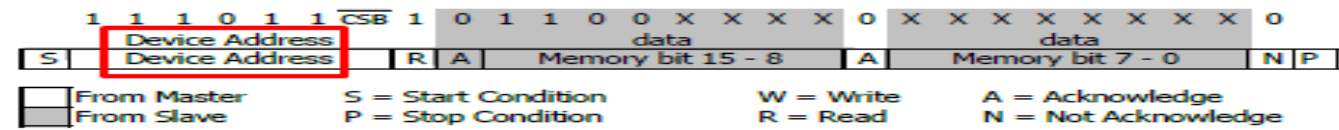


Figure 12: I²C answer from MS5611-01BA

	Command byte									hex value
Bit number	0	1	2	3	4	5	6	7		
Bit name	PR M	COV	-	Typ	Ad2/ Os2	Ad1/ Os1	Ad0/ Os0	Stop		
Command										
Reset	0	0	0	1	1	1	1	0		0x1E
Convert D1 (OSR=256)	0	1	0	0	0	0	0	0		0x40
Convert D1 (OSR=512)	0	1	0	0	0	0	1	0		0x42
Convert D1 (OSR=1024)	0	1	0	0	0	1	0	0		0x44
Convert D1 (OSR=2048)	0	1	0	0	0	1	1	0		0x46
Convert D1 (OSR=4096)	0	1	0	0	1	0	0	0		0x48
Convert D2 (OSR=256)	0	1	0	1	0	0	0	0		0x50
Convert D2 (OSR=512)	0	1	0	1	0	0	1	0		0x52
Convert D2 (OSR=1024)	0	1	0	1	0	1	0	0		0x54
Convert D2 (OSR=2048)	0	1	0	1	0	1	1	0		0x56
Convert D2 (OSR=4096)	0	1	0	1	1	0	0	0		0x58
ADC Read	0	0	0	0	0	0	0	0		0x00
PROM Read	1	0	1	0	Ad2	Ad1	Ad0	0		0xA0 to 0xAE

1. 기존에 많이 보던 **register**를 설정하고 **command** 값을 보내는 방식이 아니라, 슬레이브 어드레스만 넣으면 값을 가져올 수 있다.
2. Write시에 **register + cmd**가 아닌 **write + cmd** 방식이다.
3. I2C는 안타깝게도 뚜렷한 표준은 없기 때문에 데이터 시트를 참고해야 함.
4. 더 자세한 부분은 **MS5611.h**를 참고

3. CODE

```
#include "MS5611.h"
```

```
int main(void)
```

```
{
```

```
    char txt_buf[256] = {0};
```

```
    unsigned int buf_len;
```

```
    long pressure =0;
```

```
    double temp =0;
```

```
    double altitude =0;
```

```
    sciInit();
```

```
    disp_set("SCI Configuration Success!!\n\r\0");
```

```
    i2cInit();
```

```
    wait(10000000);
```

```
    disp_set("I2C Init Success!!\n\r\0");
```

```
    Init_MS5611(MS5611_STANDARD);
```

```
    disp_set("Init MS5611 Success!!\n\r\0");
```

```
    for (;;)    // loop()
```

```
    {
```

```
        temp = readTemperature(true);
```

```
        pressure = readPressure(true);
```

```
        altitude = getAltitude(pressure, 101110); // 서울의 해수면 높이
```

```
        sprintf(txt_buf, "altitude = %lf \t pressure = %ld \t temperature = %lf \n\r\0",  
                altitude, pressure, temp );
```

```
        buf_len = strlen(txt_buf);
```

```
        sciDisplayText(sciREG1, (uint8 *) txt_buf, buf_len);
```

```
        wait(3000000);
```

```
    }
```

```
}
```

```
typedef enum
```

```
{
```

```
    MS5611_ULTRA_HIGH_RES = 0x08,
```

```
    MS5611_HIGH_RES = 0x06,
```

```
    MS5611_STANDARD = 0x04,
```

```
    MS5611_LOW_POWER = 0x02,
```

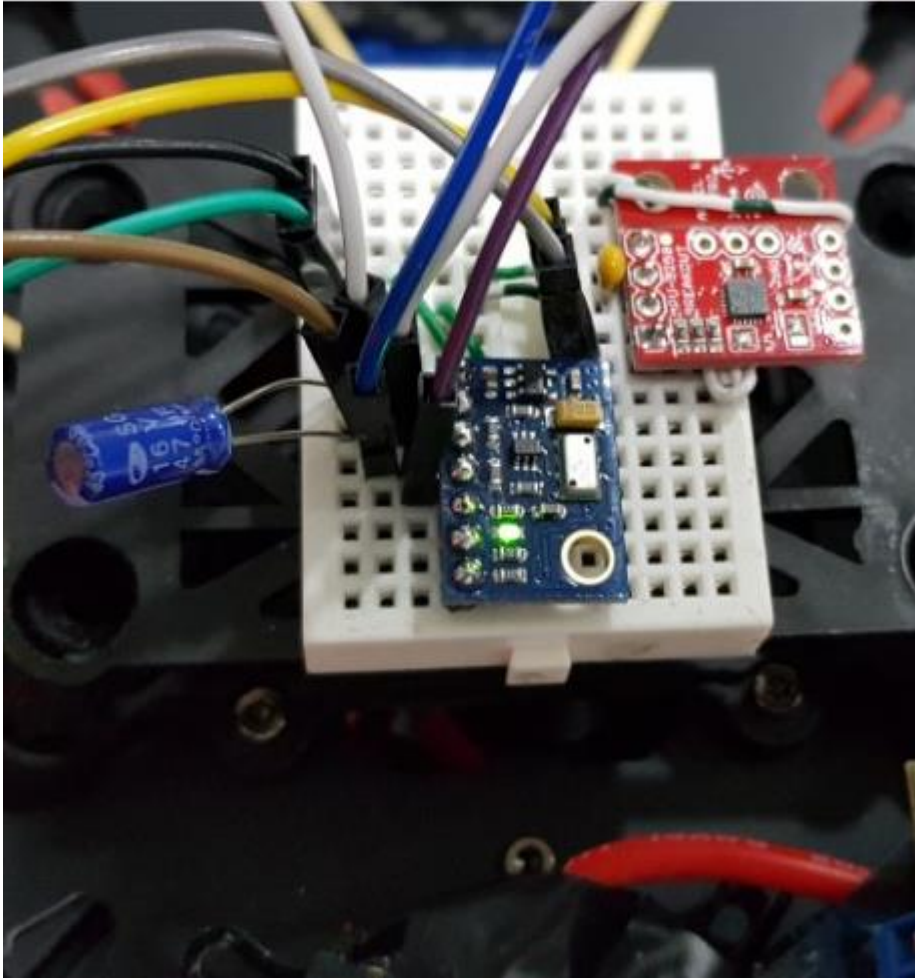
```
    MS5611_ULTRA_LOW_POWER = 0x00
```

```
} ms5611_osr_t;
```

1. Init_MS5611 함수를 호출하여 resolution 설정

2. 나머지 함수들은 header 참고

4. SIMULATION



```
altitude = 47.413504 pressure = 100543 temperature = 27.170000
altitude = 47.413504 pressure = 100543 temperature = 27.170000
altitude = 47.413504 pressure = 100543 temperature = 27.170000
altitude = 47.816391 pressure = 100537 temperature = 27.170000
altitude = 47.245880 pressure = 100545 temperature = 27.170000
altitude = 47.497317 pressure = 100542 temperature = 27.170000
altitude = 47.664944 pressure = 100540 temperature = 27.170000
altitude = 47.329692 pressure = 100549 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.497317 pressure = 100542 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.413509 pressure = 100543 temperature = 27.170000
altitude = 47.581130 pressure = 100541 temperature = 27.170000
altitude = 47.245880 pressure = 100545 temperature = 27.170000
altitude = 47.748759 pressure = 100539 temperature = 27.170000
altitude = 47.245880 pressure = 100545 temperature = 27.180000
altitude = 47.581130 pressure = 100541 temperature = 27.170000
altitude = 47.162070 pressure = 100546 temperature = 27.180000
altitude = 47.664944 pressure = 100540 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.664944 pressure = 100540 temperature = 27.170000
altitude = 47.581130 pressure = 100541 temperature = 27.170000
altitude = 47.832574 pressure = 100538 temperature = 27.170000
altitude = 47.916391 pressure = 100537 temperature = 27.170000
altitude = 47.664944 pressure = 100540 temperature = 27.170000
altitude = 47.916391 pressure = 100537 temperature = 27.170000
altitude = 47.664944 pressure = 100540 temperature = 27.180000
altitude = 47.748759 pressure = 100539 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
altitude = 47.413504 pressure = 100543 temperature = 27.170000
altitude = 47.497317 pressure = 100542 temperature = 27.170000
altitude = 47.329692 pressure = 100544 temperature = 27.170000
```

주의사항 – 전원이 안정하지 않으면 ultra high resolution 과 같은 것은 사용할 수 없으므로 전원 안정화가 중요.