

# DIGITAL MODELS CHANGING I2C SLAVE ADDRESS

## APPLICATION NOTE

### INTRODUCTION

The TE series of digital pressure sensors uses the latest CMOS sensor conditioning circuitry (SSC) to create a low cost, high performance digital output pressure (14-bit) and temperature (11-bit) sensor designed to meet the strictest requirements from OEM customers.

The MS45x5DO, 85BSD, 85FBSD, 86BSD, 154BSD, MSP100(DO) and MSP300(DO) are the latest offering from TE to offer digital communication to pressure sensor OEMs.

The purpose of this Application Note is to guide the user in the changing of I<sup>2</sup>C slave address.

Many times you may realize that sensor ports are just not enough for your project. Because the majority of sensors may be I<sup>2</sup>C, you can put lots of sensors on the same sensor port. However, you may find that some of the sensors use the same I<sup>2</sup>C address (especially if it is the same type of device). This will cause data collisions and make the information unusable in most cases. To avoid this issue, change the I<sup>2</sup>C addresses of your devices so that each device has its own unique address. This process can be performed directly by the procedure in the table below.

**Table 1: Changing I<sup>2</sup>C Slave Address**

	Action	Byte 1	Byte 2	Byte 3	Byte 4	Notes
1	Put sensor into command mode	[7 bit address *] + [Write bit = 0]	0xA0	0x00	0x00	Data must be sent within 6ms of power up
2	Command to read EEPROM word 02 from sensor	[7 bit address *] + [Write bit = 0]	0x02	0x00	0x00	
3	Fetch EEPROM word 02	[7 bit address *] + [Read bit = 1]	0x5A (response byte)	Word 02 [bits 15:8]	Word 02 [bits 7:0]	
4	Modify Word 02 in user software					Bits [9:3]: I2C address required Bits [12:10]: 011 (communication lock)

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5	Write new version of Word 02 to sensor EEPROM	[7 bit address *] + [Write bit = 0]	0x42	Word 02 [bits 15:8]	Word 02 [bits 7:0]	
6	Exit command mode & start normal operating mode	[7 bit address *] + [Write bit = 0]	0x80	0x00	0x00	

### C Code Example

The following code changes the I<sup>2</sup>C slave address.

```
#define OldI2CAddress    0x28
#define NewI2CAddress    0x36
```

```
unsigned char EEPROMdata[4];
unsigned int tempEEPROMdata;
```

```
bool SetNewI2CAddress(unsigned char OldAddress,unsigned char NewAddress);
bool EnterCommandMode(unsigned char I2CAddress);
bool ReadEEPROM (unsigned I2CAddress,unsigned char EEPROMAddress);
bool FetchEEPROM (unsigned char Address,unsigned char Quantity,unsigned char *Data);
bool WriteDataToSensor (unsigned char Address, unsigned char Quantity, unsigned char *Data);
void START(void);
void STOP(void);
bool DetectACK(void);
void SendACK(void);
```

```
void main (void)
{
    SetNewI2CAddress(OldI2CAddress, NewI2CAddress);

    for(;;)
}
```

```
bool SetNewI2CAddress(unsigned char OldAddress,unsigned char NewAddress)
{
    bool result=false;

    PowerUpSensor (); //Power up MS45x5DO sensor

    Delay (3);        //Delay 3ms.

    if (EnterCommandMode(OldAddress)==true)    //Put sensor into command mode.
    {
        if (ReadEEPROM(OldAddress,0x02)==true) //Read EEPROM word 02
        {
            if (FetchEEPROM(OldAddress,3, EEPROMdata)==true) //Fetch EEPROM word 02
            {
                if (EEPROMdata [0]==0x5A)
                {
                    tempEEPROMdata= (((EEPROMdata [1] << 8) + EEPROMdata [2]) & 0xE007) + (NewAddress << 3) + 0xC00;

                    EEPROMdata [1] = (unsigned char) ((tempEEPROMdata & 0xff00)>>8);
                    EEPROMdata [2] = (unsigned char) (tempEEPROMdata & 0x00ff);
                    EEPROMdata [0] =0x42;
                }
            }
        }
    }
}
```

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```
        if (WriteDataToSensor(OldAddress,3, EEPROMdata)==true) //Write new version of //Word 02 to sensor //EEPROM
        {
            EEPROMdata [0]=0x80;
            EEPROMdata [1]=0x00;
            EEPROMdata [2]=0x00;
            if (WriteDataToSensor (OldAddress,3, EEPROMdata)==true) //Exit command mode & //start normal operating
                //mode.
            {
                result=true;
            }
        }
    }
}
}
}

return result;
}

bool EnterCommandMode(unsigned char I2CAddress)
{
    EEPROMdata [0] = 0xA0;
    EEPROMdata [1] = 0x00;
    EEPROMdata [2] = 0x00;

    return (WriteDataToSensor (I2CAddress,3, EEPROMdata));
}

bool ReadEEPROM (unsigned I2CAddress,unsigned char EEPROMAddress)
{
    EEPROMdata [0] = EEPROMAddress;
    EEPROMdata [1] = 0x00;
    EEPROMdata [2] = 0x00;

    return (WriteDataToSensor (I2CAddress,3, EEPROMdata));
}

bool FetchEEPROM (unsigned char Address,unsigned char Quantity,unsigned char*Data)
{
    unsigned char index;

    START();

    Address=(Address<<1)+0x01;
    SendOneByteData(Address); //send address..

    if (DetectACK()==false) //check ACK.
    {
        STOP();
        return false;
    }
    //
    for (index=0; index <Quantity;index++)
    {
        Data[index]=ReadOneByteData();

        if (index<(Quantity-1))
        {
            SendACK();
        }
    }
}
```

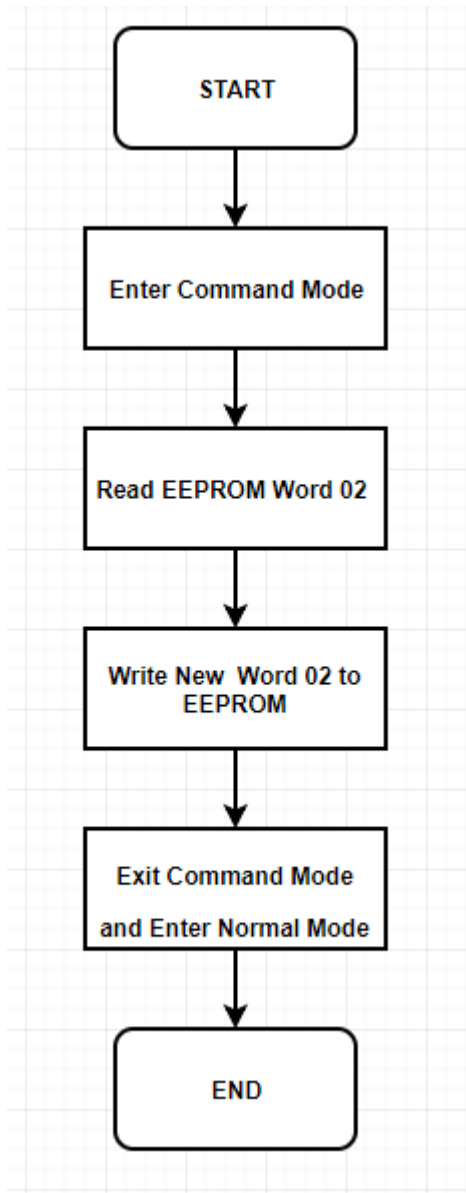
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```
    }  
}  
  
STOP();  
  
return true;  
  
}  
  
bool WriteDataToSensor (unsigned char Address, unsigned char Quantity, unsigned char *Data)  
{  
    unsigned char index;  
  
    START();  
  
    SendOneByteData(Address<<1); //send address and Write Command  
  
    if (DetectACK()==false) //check ACK.  
    {  
        STOP();  
        return false;  
    }  
  
    for(index=0;index<Quantity;index++)  
    {  
        SendOneByteData (Data[index]);  
        if (DetectACK()==false)  
        {  
            STOP();  
            return false;  
        }  
    }  
  
    STOP();  
  
    return true;  
  
}
```

Flow Chart



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