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^2C salve address.

Many times you may realize that sensor ports are just not enough for your project. Because the majority of sensors may be I^2C, you can put lots of sensors on the same sensor port. However, you may find that some of the sensors use the same I^2C 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^2C 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^2C 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)

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

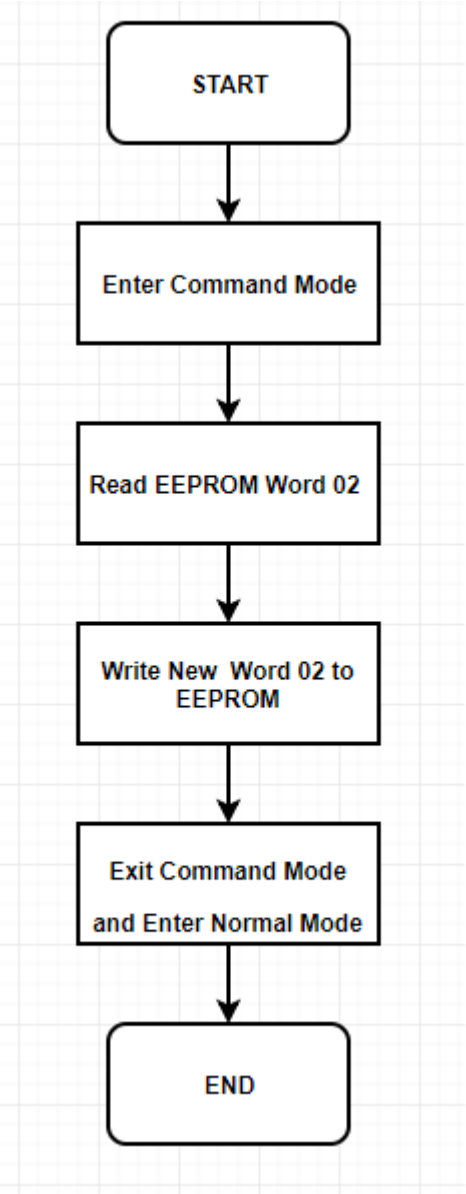
The following code changes the I²C slave address.

```
#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;
```

```
                        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();
```

```
        }
  }

  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


START
Enter Command Mode
Read EEPROM Word 02
Write New Word 02 to EEPROM
Exit Command Mode and Enter Normal Mode
END

NORTH AMERICA
Measurement Specialties, Inc.,
a TE Connectivity company
45738 Northport Loop West
Fremont, CA 94538
Tel: +1 800 767 1888
Fax: +1 510 498 1578
customercare.frmt@te.com

EUROPE
MEAS Switzerland Sarl,
a TE Connectivity company
Ch. Chapons-des-Prés 11
CH-2022 Bevaix
Tel: +41 32 847 9550
Fax: +41 32 847 9569
customercare.bevx@te.com

ASIA
Measurement Specialties (China) Ltd.,
a TE Connectivity company
No. 26 Langshan Road
Shenzhen High-Tech Park (North) Nanshan District,
Shenzhen, 518057
China
Tel: +86 755 3330 5088
Fax: +86 755 3330 5099
customercare.shzn@te.com

te.com/sensorsolutions