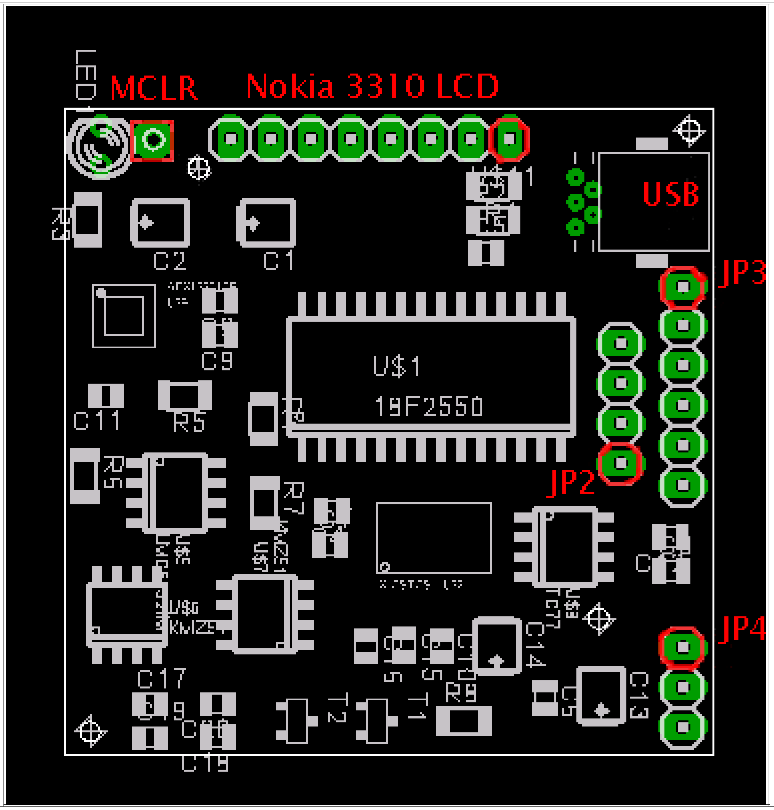
TD-CMP01, TD-CMP02 and TD-CMP03: Compass, Tilt/Roll and Temperature modules.

Here are the **technical specifications** of the modules:

- **Compass:** Resolution: 1° - Accuracy: 3°
- **Tilt/Roll:**(TD-CMP02 and TD-CMP03 only) Resolution: 2° - Accuracy: 5°
- **Temperature**: (TD-CMP03 only) Resolution= 1°C/F - Accuracy =1°
- Sampling rate: once a second.
- Easy Tilt/Roll **calibration**.(TD-CMP02 and TD-CMP03 only)
- **Interfaces: I^{2}C, RS232 and mini-USB** (as a HID device: PID=0461, VID= 1023)
- **Powered by USB bus** or an external 5V.
- **Direct LCD readout** possible. LCD contrast by user.
- Low power LED blinks when facing North/East/South/West.
- USB **Windows application** (written in C#) available for free download.)
- **Source code** (CCS C and C# .NET) and **schematics** (Eagle) can be purchased separately.
- Module software is **100% upgradable** with a simple bootloader.
- PCB Dimensions: 40 x 41 mm or 1"57 x 1"61, weight: 10 grams.

Module diagram



Header pinouts

JP2 pins	RS232	JP3 pins	I²C	JP4 pins	POWER SOURCE
1	+5V	1	+5V	1	EXT (from JP3)
2	RX	2	SCL	2	COMMON
3	GND	3	SDA	3	USB
4	TX	4	GND / TEMP SENSOR -		
		5	ADJUST		
		6	TEMP SENSOR +		

Power Source: JP4: Connect pin 2 to pin 3 to power with the USB bus. Connect pin 1 to pin 2 when powered externally via JP3, pin 1.

LCD contrast Adjust: Connect pin 5, JP3 to +5V **before powering up**. Release when the desired the contrast is reached.

Tilt/Roll Calibration: (TD-CMP02 and TD-CMP03 only): First place the module on a completely flat surface, then apply +5V to ADJUST (pin 5, JP3)

Module RESET: apply GND to MCLR pin.

Temperature sensor: (TD-CMP03 only): The external LM335Z sensor connects to JP3 pin 4 and 6. No temperature will be displayed when the sensor is removed.

RS232 interface: JP2 provides the interface to connect to your COM port and hyper terminal.

Also used for bootloading (module software update.) Check under the download section below for the latest version.

Bootloading of the HEX-file can be done with Tiny Bootloader 1.91

I²C interface: JP3 allows us to connect to another µC.

The module is the slave device on **address 0xa0**. It can be read via a simple EXT_EEPROM command.

Download this I²C CCS C example to see how to connect I²C with a 18F452.

Don't forget to change the POWER SOURCE (JP4) and connect pin 1 to pin 2.

Internal 8 bit registers are:

```
• i2c_buffer[7]= t_hi;          // temperature high byte (unsigned int8)
  i2c_buffer[6]= t_lo;          // "   "   "   "   low byte
• i2c_buffer[5]= adxl_y;        // roll (signed int8)
  i2c_buffer[4]= adxl_x;        // tilt " " " "
  i2c_buffer[3]= cmp_UMSB;
  i2c_buffer[2]= cmp_LMSB;
  i2c_buffer[1]= cmp_ULSB;      // compass 0..359
  i2c_buffer[0]= cmp_LLSB;      // " " " "
```

Reading the module (ccs c code):

```
• #include <2401.c>          // for I²C EXT.EEPROM emulation used by slave i²c TD-CMP modules
• ...
• int8 cmp_LLSB,cmp_ULSB;
• int16 compass_degrees;
• signed int8 adxl_x,tilt_degrees;
• signed int8 adxl_y,roll_degrees;
• ...
• init_ext_eeprom();         // init TD-CMP module as slave I²C ext.EEPROM
• ...
• cmp_LLSB = READ_EXT_EEPROM(0x00);    // read TD-CMP register 0 (cmp_LLSB)
• cmp_ULSB = READ_EXT_EEPROM(0x01);    // read TD-CMP register 1 (cmp_ULSB)
• adxl_x = READ_EXT_EEPROM(0x04);      // read TD-CMP register 4 (adxl_x) Tilt
• adxl_y = READ_EXT_EEPROM(0x05);      // read TD-CMP register 5 (adxl_y) Roll
• ...
• compass_degrees= ((int16)cmp_ULSB<<8)+cmp_LLSB;   // here's the data we needed
• tilt_degrees= adxl_x;
• roll_degrees= adxl_y;
```

USB interface: is HID (Human Interface Device) on PID=0461, VID= 1023

Each packet is 8 bits long (4 bytes address and 4 bytes data.)

- Address 0x01000004: cmp_UMSB, cmp_LMSB, cmp_ULSB, cmp_LLSB (compass)
- Address 0x01000003: t_hi, t_lo (temperature), adxl_y (roll), adxl_x (tilt) signed int8

Low power LED: Will light up shortly when USB is connected and enumerated.

Also the LED will blink several times, according to the capital direction it is facing:

- North: 1x
- East: 2x
- South: 3x
- West: 4x