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# STPM01

## USER MANUAL

# QUICK APPLICATION User Guide

Release 1.0



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# STPM01- QUICK APPLICATION USER GUIDE

## 1 - USING THE GUI

The GUI (Graphical User Interface) provides immediate and easy access to all options you need to set in order to use the STPM01 device.

The STPM01 Manager Functionalities are split in five main groups:

– Interactive information memo,

– Panel Page for Setting and manual Calibration features,

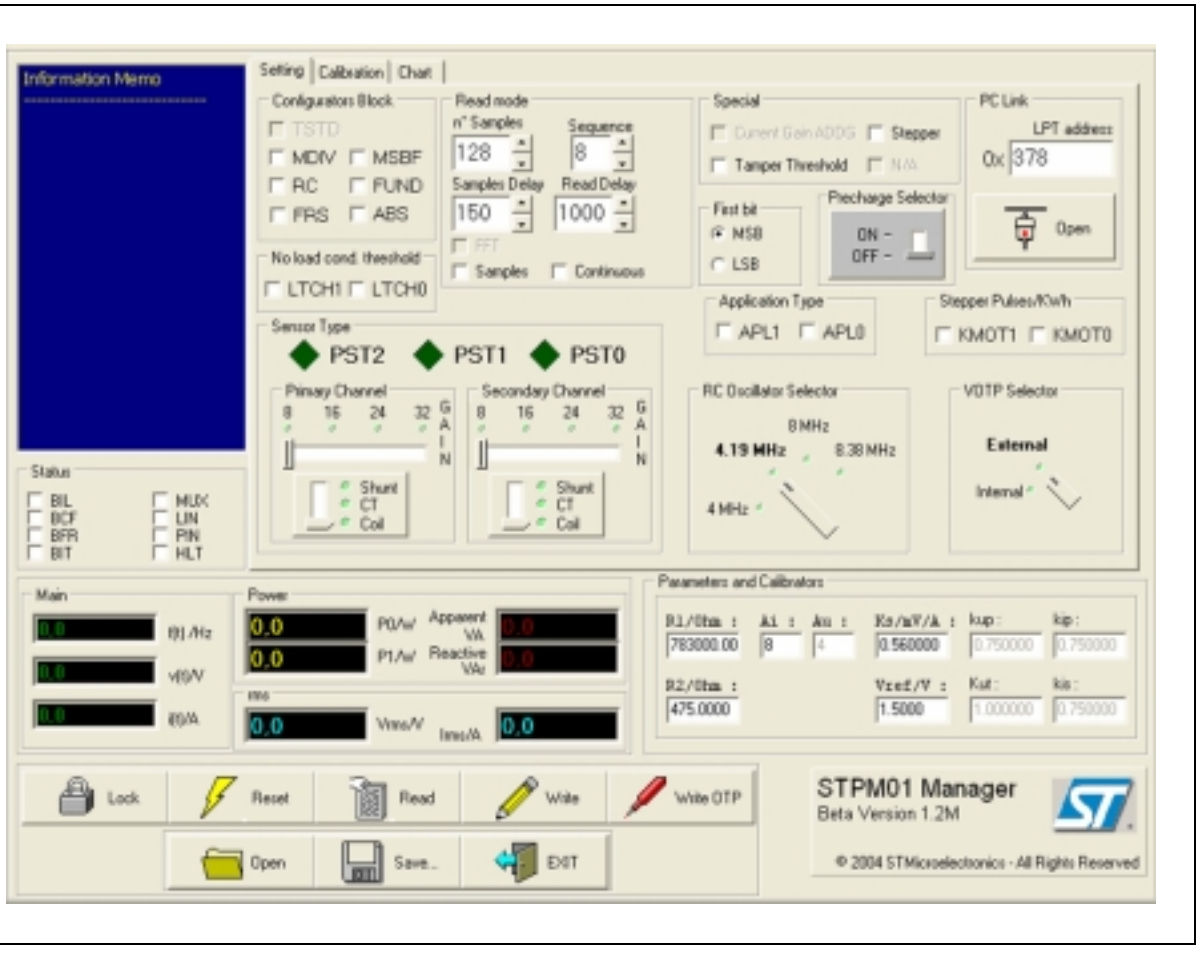
– Measured Information Panel to show mainly information about the measurement,

– Parameters to set and read relevant data,

– Control buttons.

The GUI is showed below:

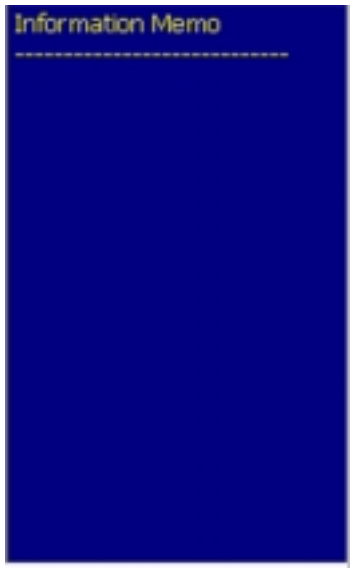
**Figure 1 :** GUI



## 2 - INTERACTIVE INFORMATION MEMO

The Interactive Information Memo allows the reading of all relevant messages coming from GUI. For instance, the picture below tells you to set the interface type as first step

**Figure 2 :** Interactive Information Memo



### 3 - STATUS BITS

The Status Bits allow you to know the information coming from the device status register.

**Figure 3 :** STATUS BITS




**Table 1 :** Meaning of status bits in the 1.1. data records

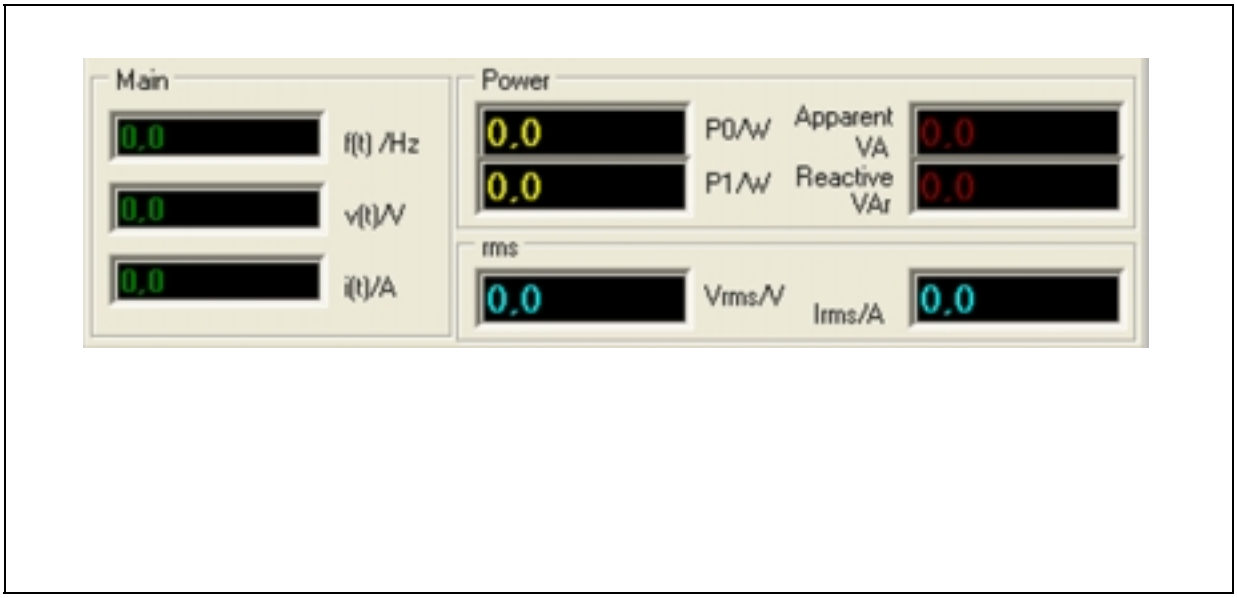
| G.R. | Name | Meaning of status bit value 0 | Meaning of status bit value 1 |
|---|---|---|---|
| 0 | BIL | no load condition not detected | no load condition detected |
| 1 | BCF | both $\Delta\Sigma$ signals alive | one or both $\Delta\Sigma$ signals stacked |
| 2 | BFR | $f_{CLKOUT}/2^{17} < f(u) < f_{CLKOUT}/2^{15}$ | f(u) out of limits |
| 3 | BIT | tamper is not detected | tamper is detected |
| 4 | MUX | selected primary current channel | selected secondary current channel |
| 5 | LIN | positive half period of u | negative half period of u |
| 6 | PIN | output pins follow data | at least one pin differs from data |
| 7 | HLT | data are valid | retarded restart in progress |

## 4 - MEASURED INFORMATION

The Measured Information allows you to read:

1 Frequency main, F(V)/Hz
2 Instantaneous Voltage value, V(t)/V
3 Instantaneous Current value, I(t)/A
4 Active Power considering until the 50th harmonic, P0/W
5 Active Power considering only the fundamental harmonic, P1/W
6 Apparent Power
7 Reactive Power
8 VRMS/V and IRMS/A information.

**Figure 4 :** Measured information



## 5 - PARAMETERS

The Parameters window allows the user to change some common constants used by the GUI application. Those constants are hardware dependant:

1 Resistor divider (R1 and R2) at voltage input of STPM01 must be set according to the hardware specifications;

2 Current gain (Ai) will change according to the PST bits setting while voltage channel gain (Au) is fixed and cannot be changed;

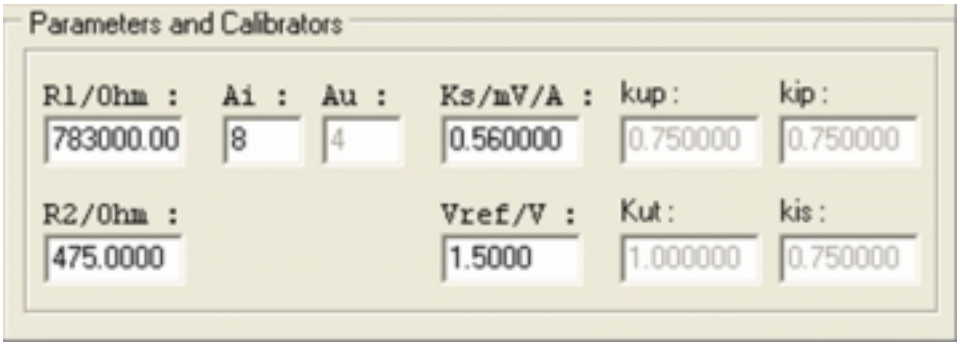
3 Current sensor sensitivity (Ks/mV/A) must be set according to the particular characteristics of the current sensor used;

4 Value of calibrators (Kup, Kip, Kis). This value changes according to the calibrators value for voltage and current channel;

5 Internal reference voltage, to be set according to the datasheet.

Change those constants accordingly, to reflect real state on the STPM01 evaluation board.

**Figure 5 :** Parameters



## 6 - PANEL PAGE

The Panel Page is divided in two main parts, Setting and Calibration:

1 Setting:

**Figure 6 :** Setting

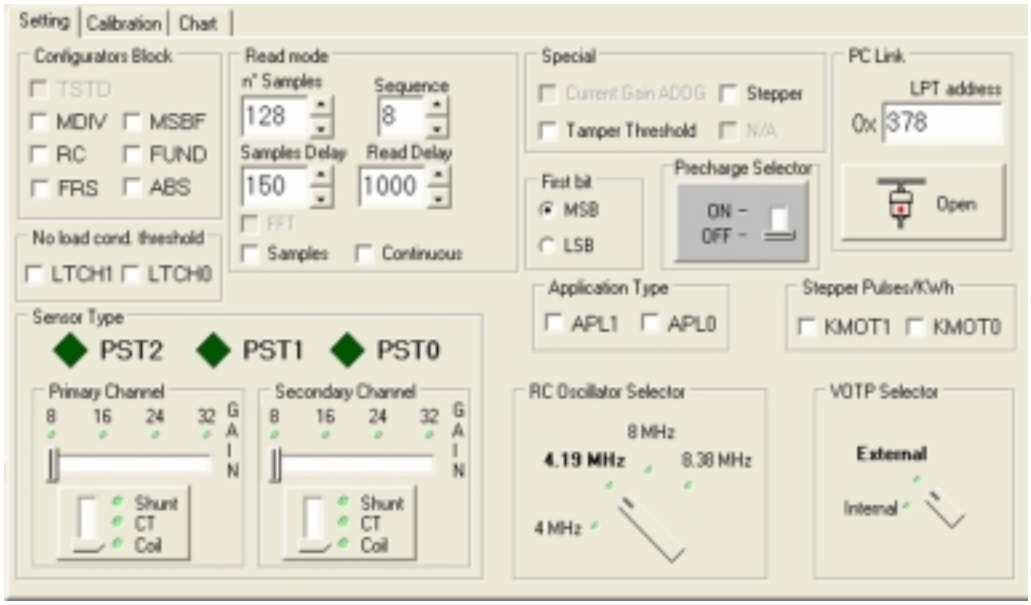



**Table 2 :** Setting

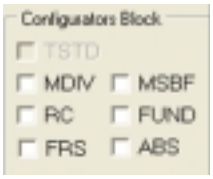
| Function | Panel |
|---|---|
| Calibration:Configuratiors Block shows configuration bits used for changing operating modes.<br>TSTD: Test mode and OTP write disable:<br>TSTD=0:testing and continuous precharge of OTP when in read mode,<br>TSTD=1:normal operation and no more writes to OTP<br>MDIV: Measurement frequency range selection:<br>MDIV=0:4.000MHz-4.194MHz,<br>MDIV=1:8.000MHz-8.192MHz<br>RC: Type of internal oscillator selection:<br>RC=0:crystal oscillator,<br>RC=1:RC oscillator<br>FRS: Base frequency out of band influence to power calculation:<br>FRS=0:if BFR then power=i*0,<br>FRS=1:if BFR then power=i*u<br>MSBF: Bit sequence output during record data reading selection:<br>MSBF=0:msb first,<br>MSBF=1:lsb first<br>FUND: Type0 active energy selection:<br>FUND=0:type0 is total,<br>FUND=1:type0 is fundamental<br>ABS: Power accumulation type selection:<br>ABS=0:signed accumulation,<br>ABS=1:absolute accumulation |  |

**Table 2 :** Setting

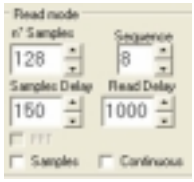
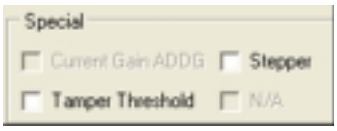
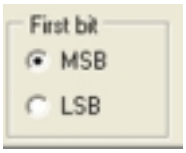
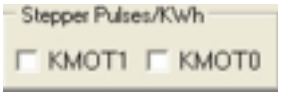
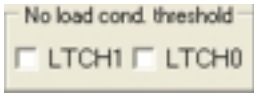
| Function | Panel |
|---|---|
| Read mode can be normal and in continous and fast STPM01 reading (S is checked) in FULL version.<br>Application can be used for computing FFT of current and voltage data from STPM01 only if samples are read in constant sampling rate(FULL version). |  |
| Special shows some bits used for changing:<br>ADDG: Selection of adding current gain 8:ADDG=0: Gain+=0,<br>ADDG=1: Gain+=8<br>CRIT: Selection of tamper threshold:<br>CRIT =0: 12,5%,<br>CRIT =1: 6,25%<br>LVS: Type of stepper selection:<br>LVS=0: 10 poles, 30ms, 5V,<br>LVS=1: 2 poles, 150ms, 3V |  |
| Press the button to open the parallel link between GUI program and programmer board.<br>Perform this step before of others all. |  |
| First bit is used for selecting MSB or LSB order during reading. Refer to STPM01 user manual for meaning of MSBF bit located in Configurators Blockwindow. |  |
| Stepper Pulse/KWh shows some bits used for changing:<br>Constant of stepper pulses/kWh selection when APL>1:<br>If LVS==0 KMOT=0:1000, KMOT=1:500, KMOT=2:2000, KMOT=3:250<br>If LVS==1 KMOT=0:100, KMOT=1:50, KMOT=2:200, KMOT=3: 25<br>Selection of pulses(X) for LED when APL=0:<br>KMOT=0: X=P,<br>KMOT=1: X=P,<br>KMOT=2: X=Q,<br>KMOT=3: X=S |  |
| No load cond.threshold shows some bits used for changing the no load condition threshold as % of nominal current selection in this way:<br>LTCH=0: 0.05%,<br>LTCH=1: 0.1%,<br>LTCH=2: 0.2%,<br>LTCH=3: 0.4% |  |

**Table 2 :** Setting

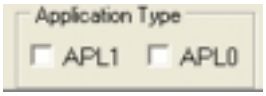
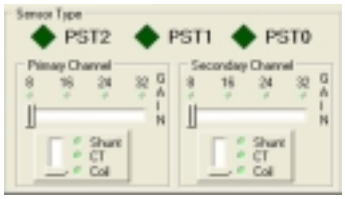
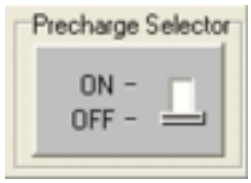
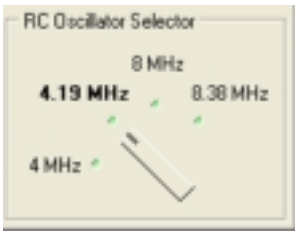
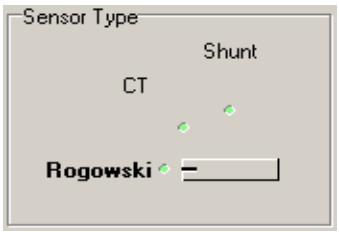
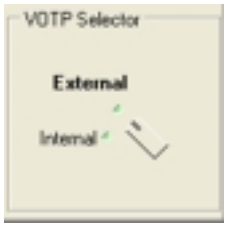
| Function | Panel |
|---|---|
| Application type shows some bits to select between Peripheral or Standalone mode, in these terms:<br>APL=0: peripheral, MOP:MON=ZeroCross:Reset, LED=pulses(X),<br>APL=1: peripheral, MOP:MON=ΔΣouts(u:i), LED=mux(current),<br>APL=2: standalone, MOP:MON=stepper(P), LED=pulses(P)<br>SCLNLC=no load condition, SDATD=tamper detected<br>SYN=negative power direction<br>APL=3: standalone, MOP:MON=stepper(P), LED=pulses(P/64),<br>SCLNLC=no load condition, SDATD=tamper detected<br>SYN=negative power direction |  |
| Current ch.sensor type is used to set the sensor type gain and tamper:<br>PST=0:primary is coil x8/x16[1], secondary is not used, no tamper<br>PST=1:primary is coil x24/x32[1], secondary is not used, no tamper<br>PST=2:primary is CT x8, secondary is not used, no tamper<br>PST=3:primary is shunt x32, secondary is not used, no tamper<br>PST=4:primary is coil x8/x16[1], secondary is coil x8/x16[1], tamper<br>PST=5:primary is coil x24/x32[1], secondary is coil x24/x32[1], tamper<br>PST=6:primary is CT x8, secondary is CT x8, tamper<br>PST=7:primary is CT x8, secondary is shunt x32, tamper |  |
| Precharge will swap data sequence order during STPM01 readout.<br>Refer to STPM01 user manual for precharge command |  |
| RC Oscillator has the same meaning as MDIV bit. |  |
| Sensor Type has the same meaning as PST bits |  |

**Table 2 :** Setting

| Function | Panel |
|---|---|
| VOTP selector is used to set if Votp is internal or external.<br>Refer to STPM01 user manual for more details. |  |

2 Calibration:

**Figure 7 :** Calibration

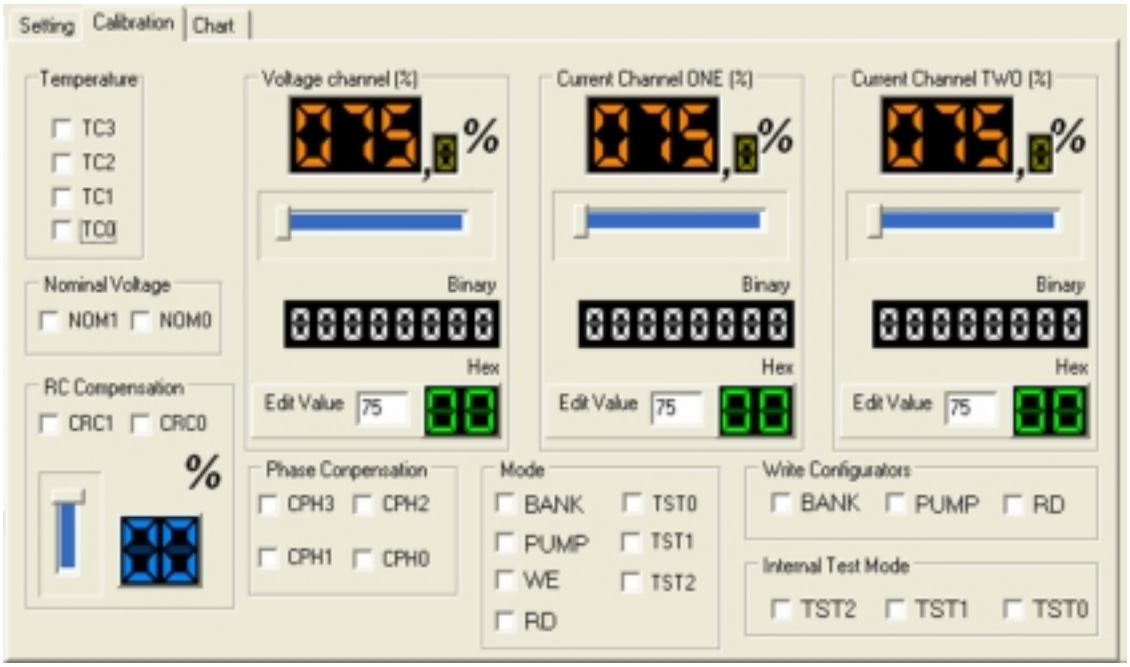



**Table 3 :** Calibration

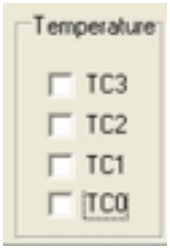
| Function | Panel |
|---|---|
| Use Temperature to set BandGap temperature compensation. |  |

**Table 3 :** Calibration

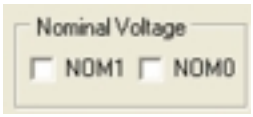
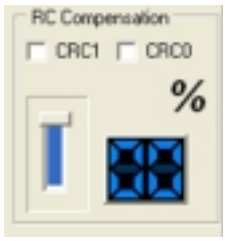
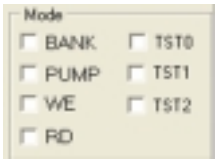
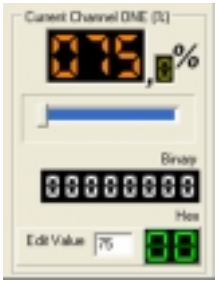
| Function | Panel |
|---|---|
| Nominal V is used to modify the nominal voltage value for singlewiremeter in these terms:<br>NOM=0: 220V,<br>NOM=1: 240V,<br>NOM=2: 260V,<br>NOM=3: 280V, |  |
| RC Compensation is used to set the internal RC compesation in this way.<br>Refer to STPM01 user manual for more details. |  |
| Phase Compensation is used to set the compensation of the phase.<br>Refer to STPM01 user manual for more details. |  |
| Mode shows the operating mode of STPM01 |  |
| The Write Configurators window shows special mode commands used for selecting various modes of operation. Please refer to STPM01 user manual for the meaning of special commands. |  |
| Voltage allows voltage channel calibration.<br>Refer to STPM01 user manual for more details. |  |

**Table 3 :** Calibration

| Function | Panel |
|---|---|
| Current ONE allows the primary current channel calibration.<br>Refer to STPM01 user manual for more details. |  |
| Current TWO allows the secondary current channel calibration.<br>Refer to STPM01 user manual for more details. |  |

### 7 - CONTROL BUTTONS

Three buttons allow you to open and save your work session and to quit the application.

**Figure 8 :** Control Button



## 8 - APPENDIX A

### 8.1 - Writing data

The user can also write data bits in STPM01. Refer to the STPM01 user manual for more detailed information about the meaning of written data bits.

The data bits that can be written in STPM01 are:

1 CHVs, CHPs and CHSs,
2 TCs
3 CPHs
4 CRCs
5 NOMs
6 APLs
7 PSTs
8 LTCHs
9 KMOTs
10 ADDG
11 CRIT
12 LVS
13 MDIV
14 RC
15 FRS
16 MSBF
17 FUND
18 ABS
19 Write Configurators section.

Refer to the STPM01 user manual for the meaning.

Note: Writing a signle bit is possible only for data bits (in this case mode command) located in the Write Configurators group.

**Figure 9 :** Write Button

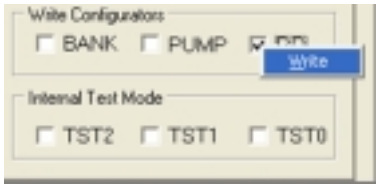



### 8.2 - Sending mode command to STPM01

The bits used to change the special modes of STPM01 are located in the group named Write Configurators. Note that those bits are written seperately. Refer to the STPM01 user manual for the meaning of the various operating modes.

To write a mode bit check or uncheck the box next to the bit name and press the mouse right button. A new menu will show up with just one option: Write. Click this option to write the selected bit in STPM01. Press the read button to see if writing was successful.

**Figure 10 :** Write to OPT Button



### 8.3 - Writing to shadow latches

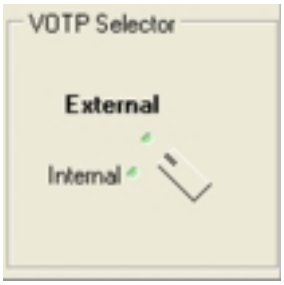
To write selected bits to shadow latches make sure that STPM01 is operating in the right mode (please refer to STPM01 user manual). The user can check the operating mode by reading data from STPM01.

Select all data bits you want to write in STPM01 and then click the Write button.

### 8.4 - Writing to OTP

Writing selected bits to OTP is similar to writing to shadow latches. STPM01 must operate in the right mode. Note that a high voltage must be available to the STPM01. The high voltage source is selected from:

**Figure 11 :** Write to OPT Button




### 8.5 - Locking STPM01

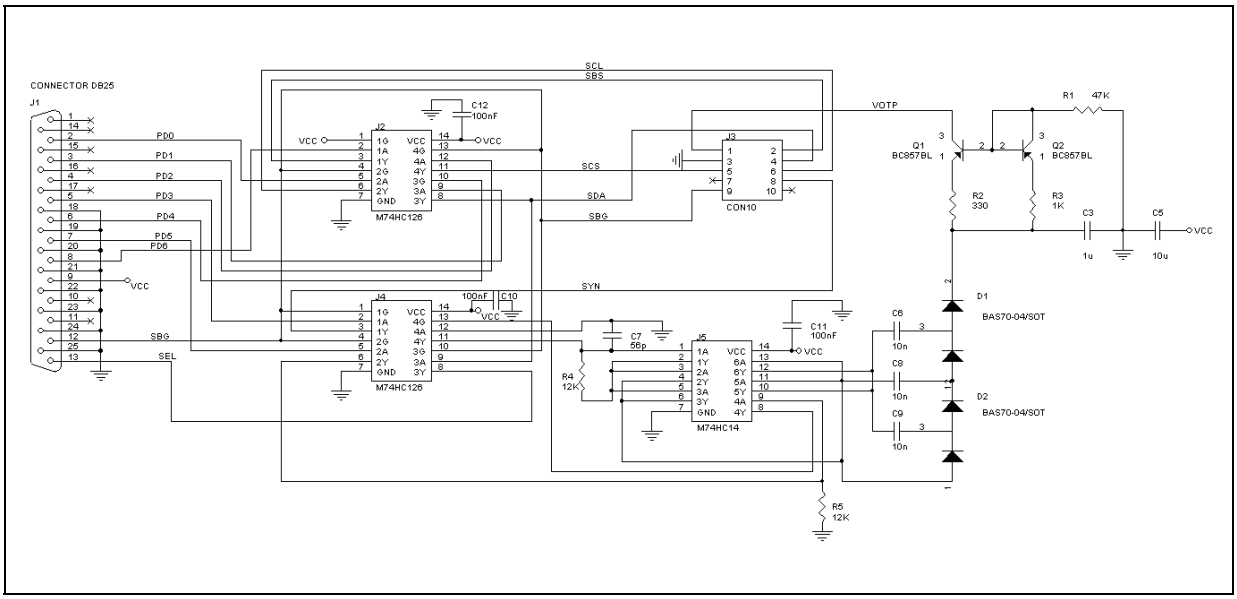
The lock button is used for final write of a special bit named TSTD in STPM01. Use with care as no more writing can be done to the STPM01.

## 9 - APPENDIX B

### 9.1 - PROGRAMMER

In order to use the STPM01 Manager GUI you must use the programmer, whose schematic is shown below:

**Figure 12 :** Programmer

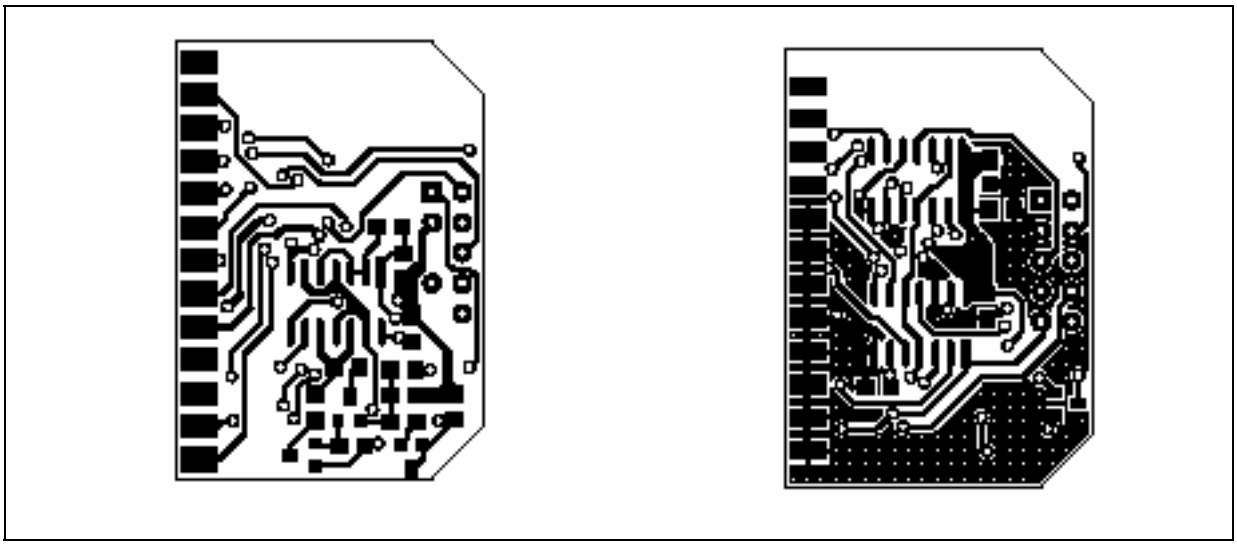



Using the programmer is very easy. After you developed the board (see the PCB below) and connected it to the PC parallel port you have to connect it to the Measurement Board of the Power Meter Kit. Make sure that pin 1 of the cable is connected to the right pin on the board. You can recognize it by the mark printed on the PCB.

Switching on the PC and running the STPM01 Manager GUI you will be able to use all functions of the Power Meter Kit.

Take care that you must power on the Measure Board if you want to program the OTP inside the STPM01. On the contrary power on the Measure Board is not necessary if you want only to read and write(not OTP write) the RAM inside the STPM01.

**Figure 13 :** PCB, top and bottom layout



## 10 - REVISON AND LEGAL INFORMATION

**Table 4 :** Revision History

| Date | Revision | Description of Changes |
|---|---|---|
| 22-Feb-2005 | 1 | First Release. |

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