Spektrometer GH1 – C1288MA

Gerd Heinz, 2/2017

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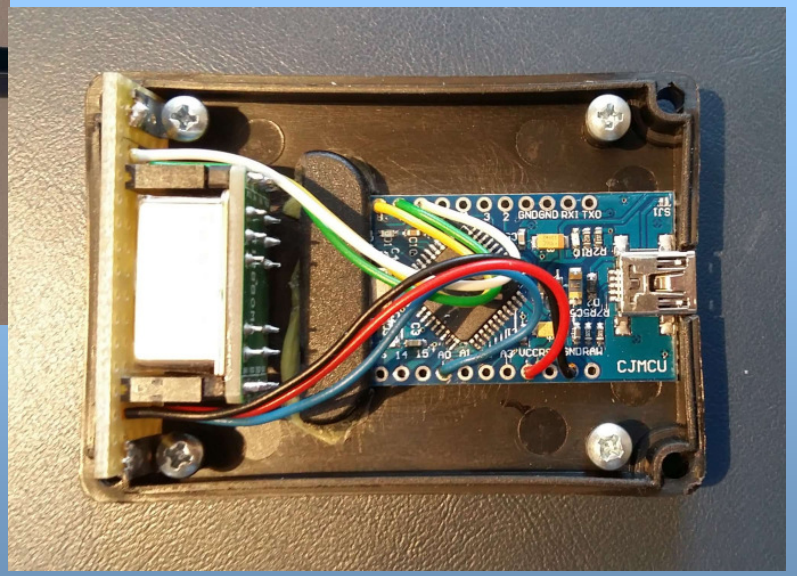
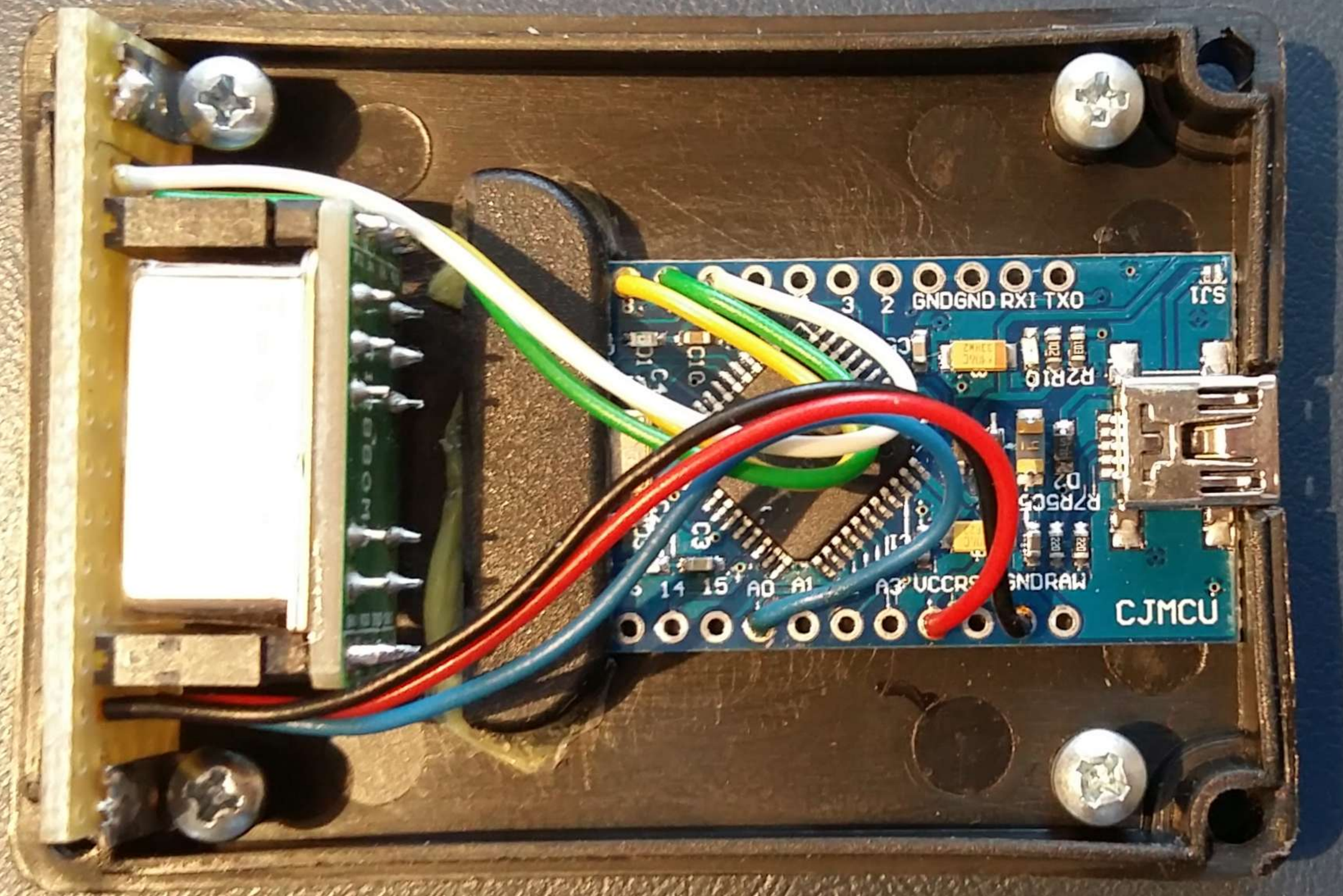
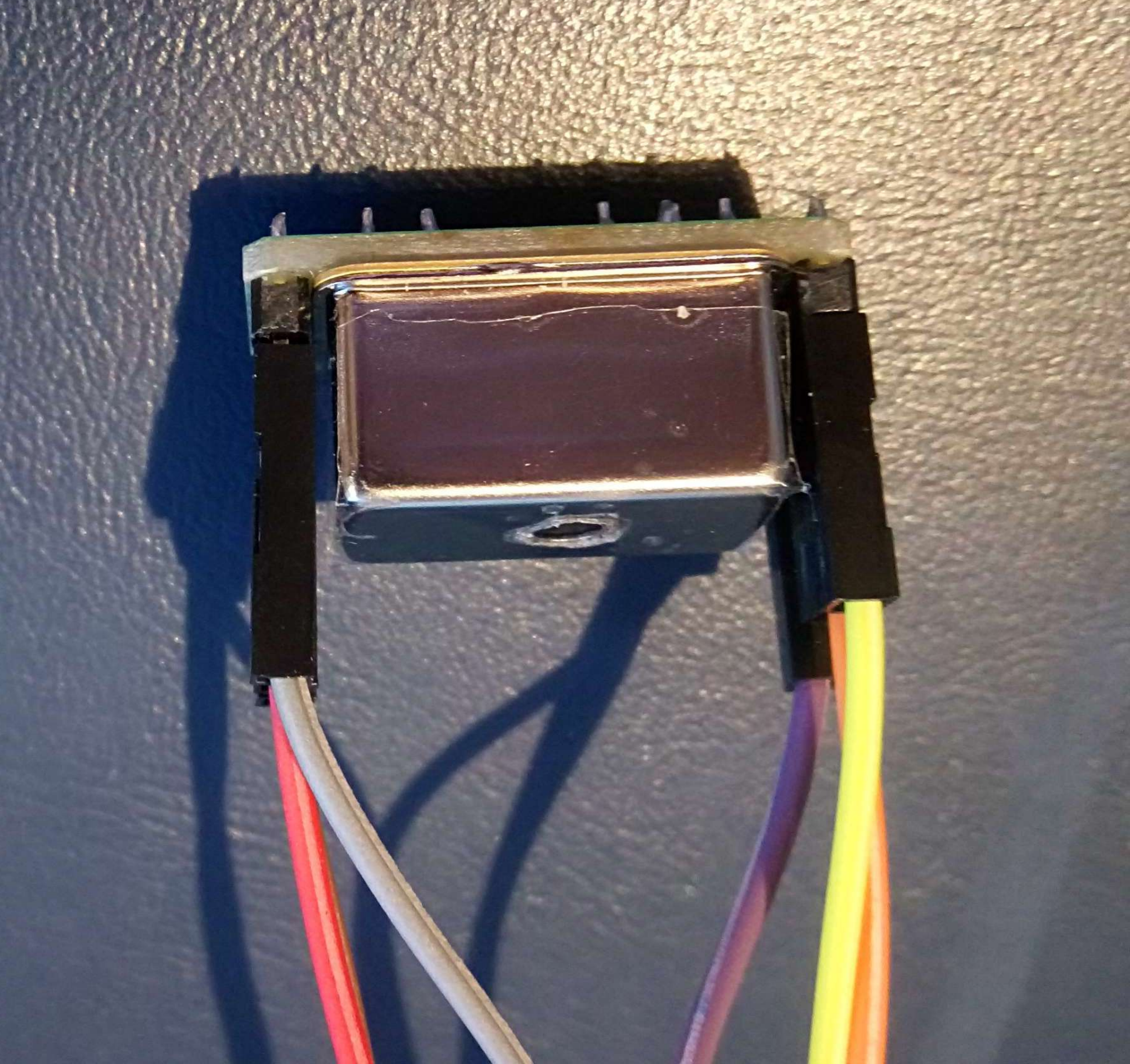
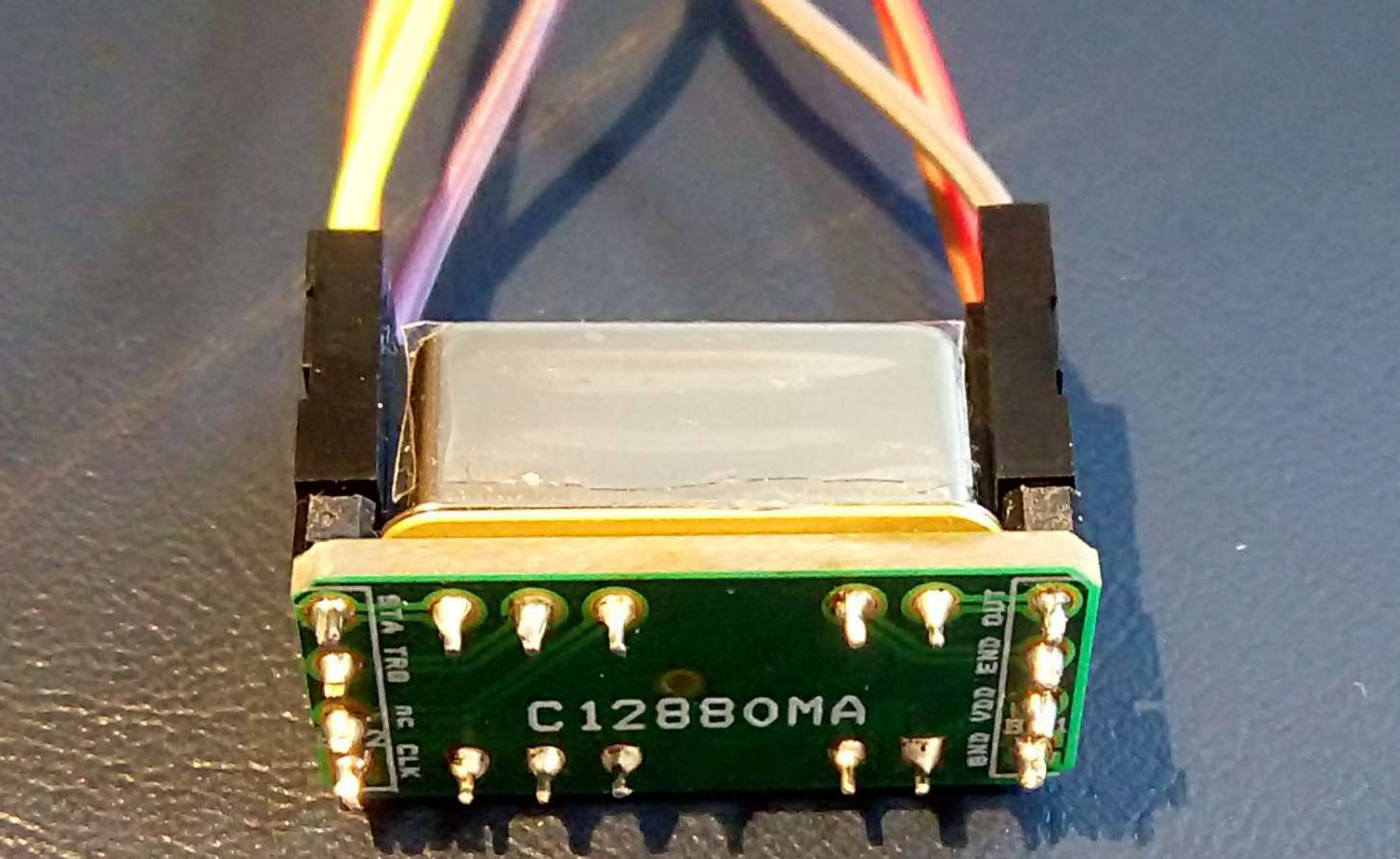


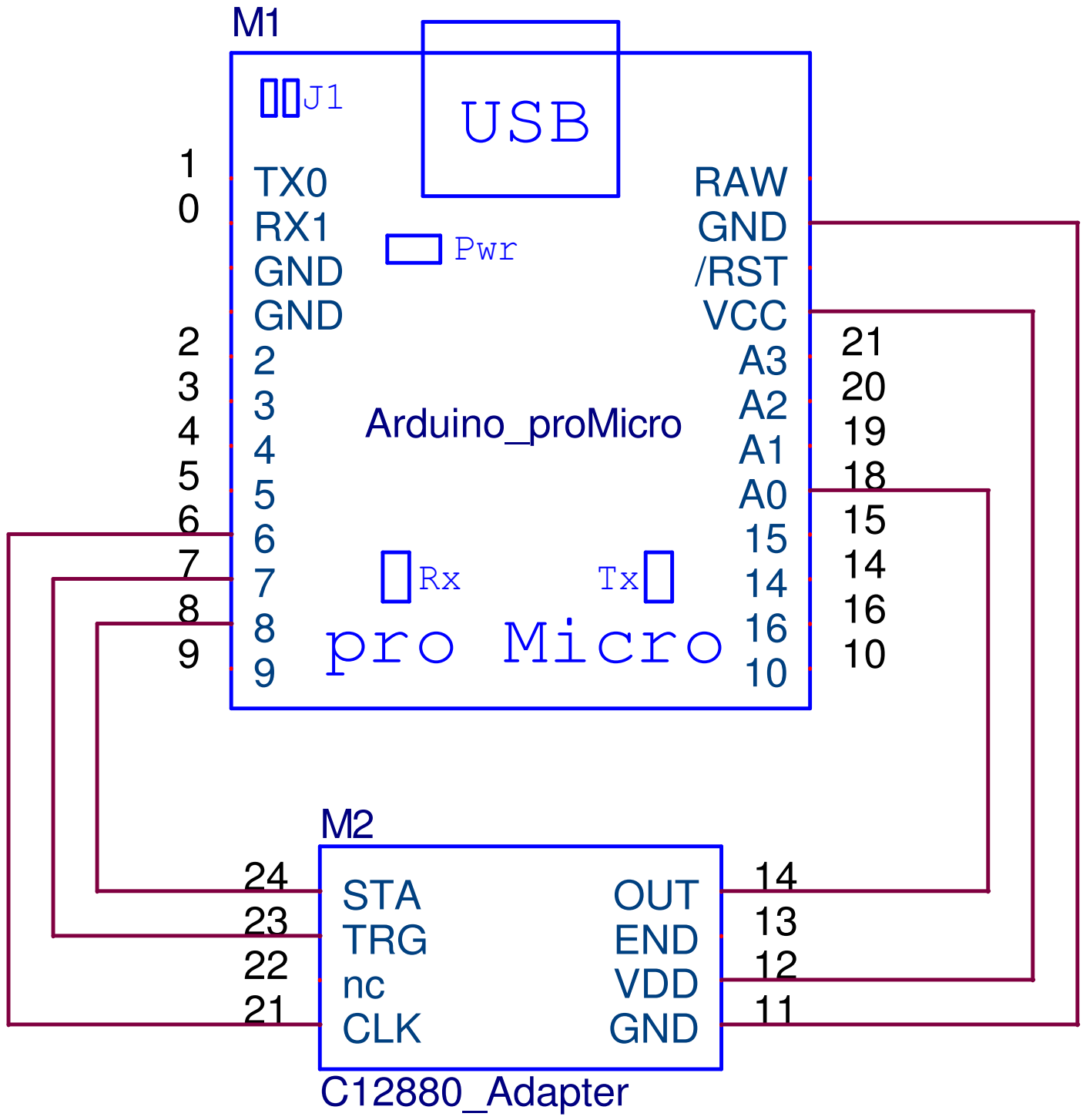
Kurzanleitung

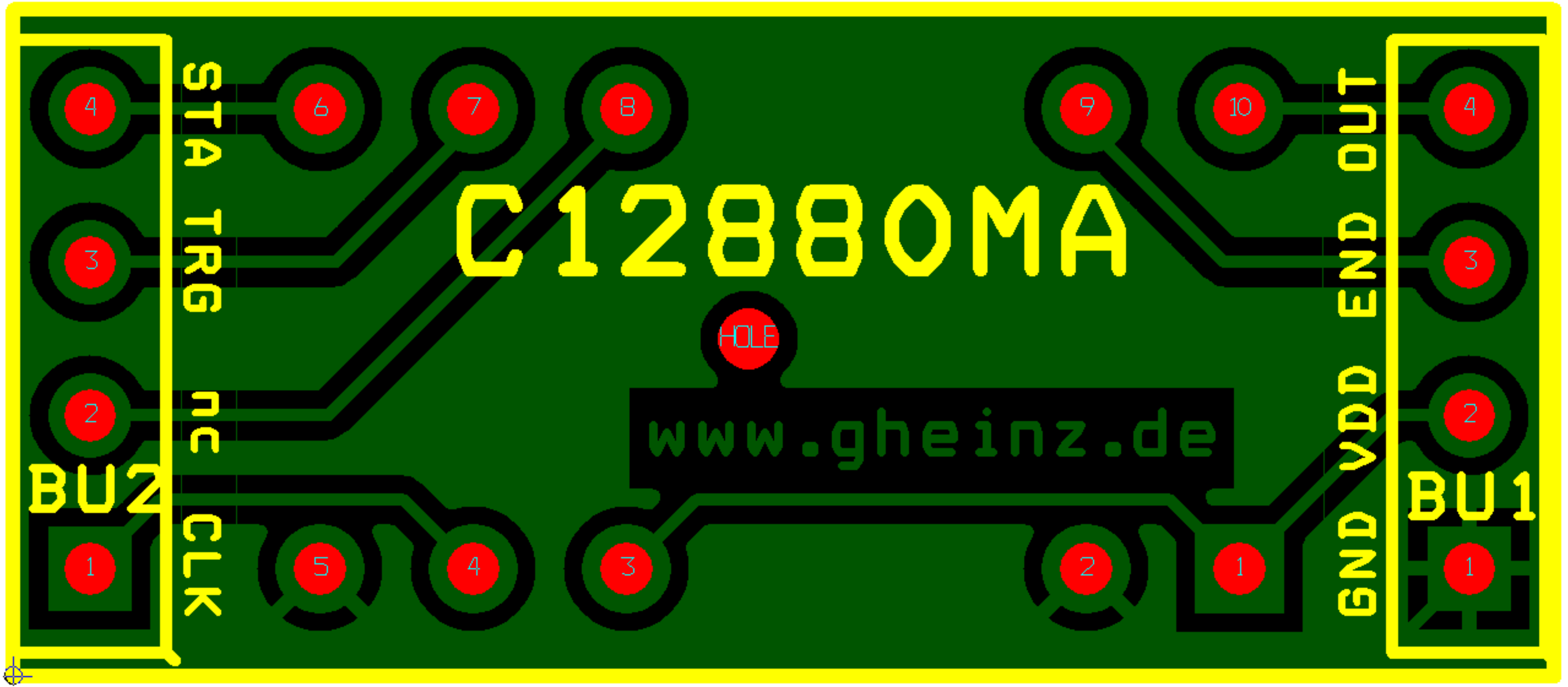
- Spektrometer durch USB-Mini-Kabel mit PC verbinden
- "Automatisch nach neuem Treiber suchen" → Arduino Leonardo
- Windows installiert Treiber: "Neue Software kann jetzt verwendet werden"
- Software Spectrometer_C12880MA.exe auf PC starten; Varianten:
  - Win32 oder Win64
  - Linux32 oder Linux64
  - Linux-ARM64 oder Linux-ARMv6hf
- Spektrometer-Window erscheint
- Helligkeit einstellen (ADCmax sollte unter 1000 liegen)
- Für Hilfe irgendeine Taste drücken, z.B. 'h'
- Befehle
  - h help on/off
  - a moving average
  - t test-marker
  - s Skale anzeigen
  - d Debug (zur Processing3-Konsole)

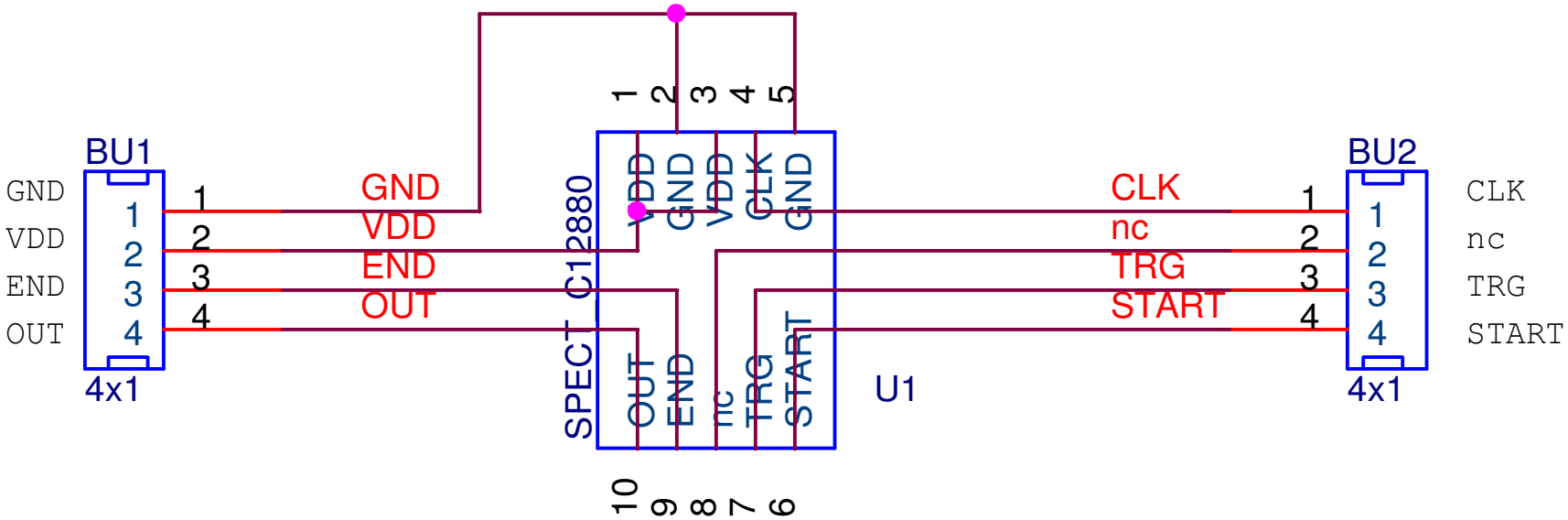

GNDGND RXI TXO
J1
CJMCU



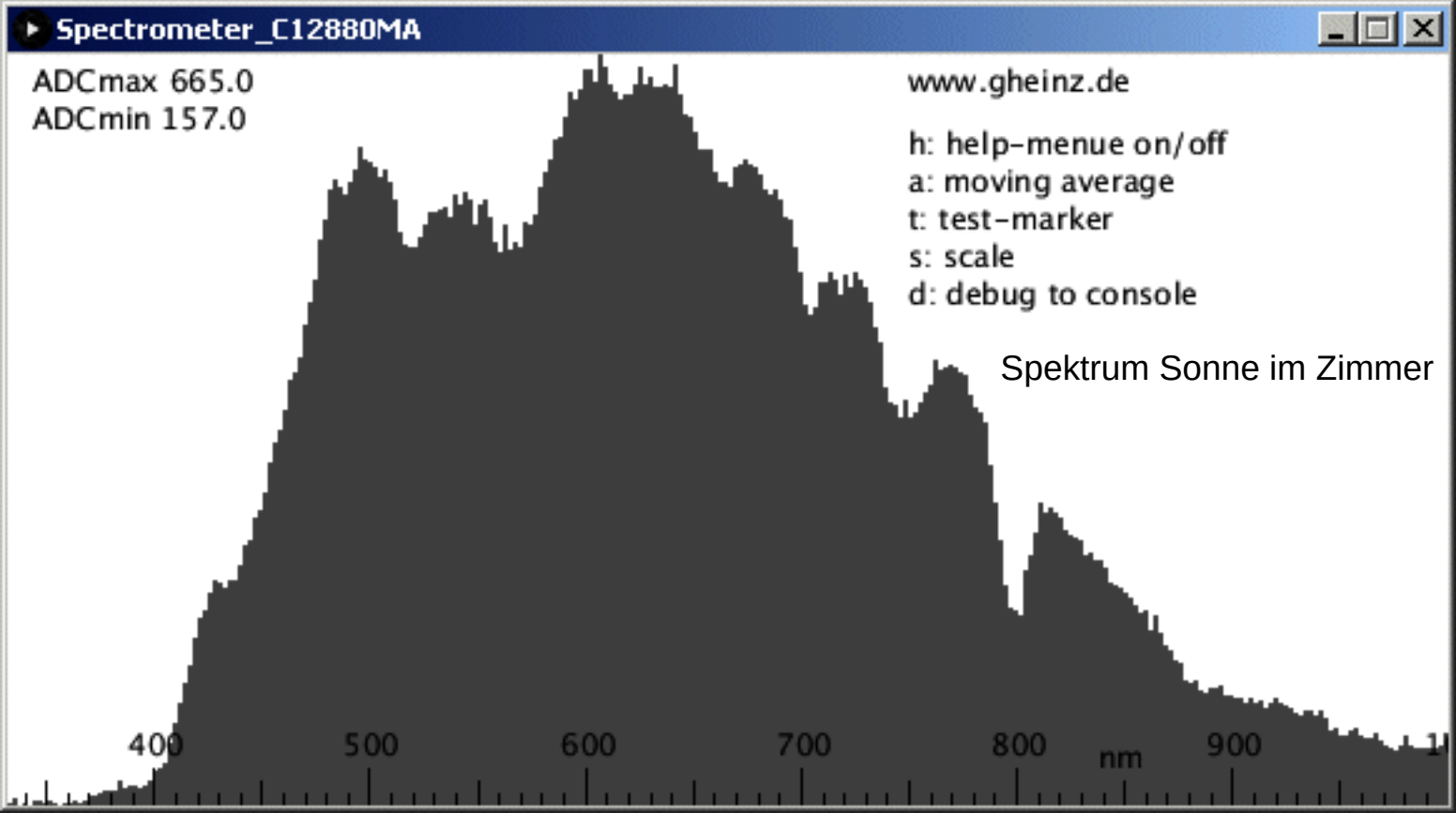

C1288OMA

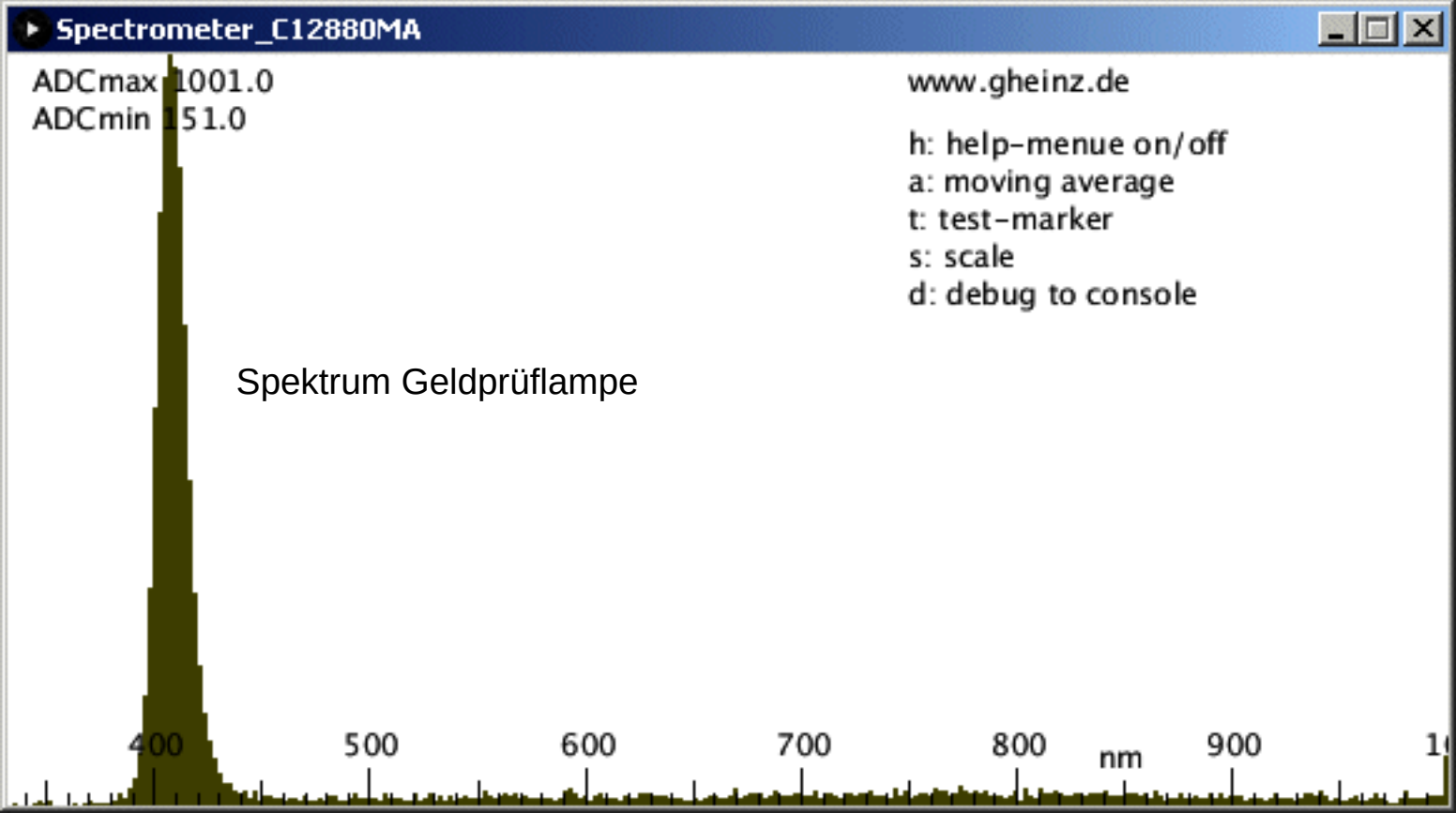

M1
J1
USB
1
0
TX0
RX1
GND
GND
Pwr
RAW
GND
/RST
VCC
2
3
4
5
6
7
8
9
2
3
4
5
6
7
8
9
Arduino_proMicro
A3
A2
A1
A0
15
14
16
10
21
20
19
18
15
14
16
10
Rx
Tx
pro Micro
M2
24
23
22
21
STA
TRG
nc
CLK
OUT
END
VDD
GND
14
13
12
11
C12880_Adapter

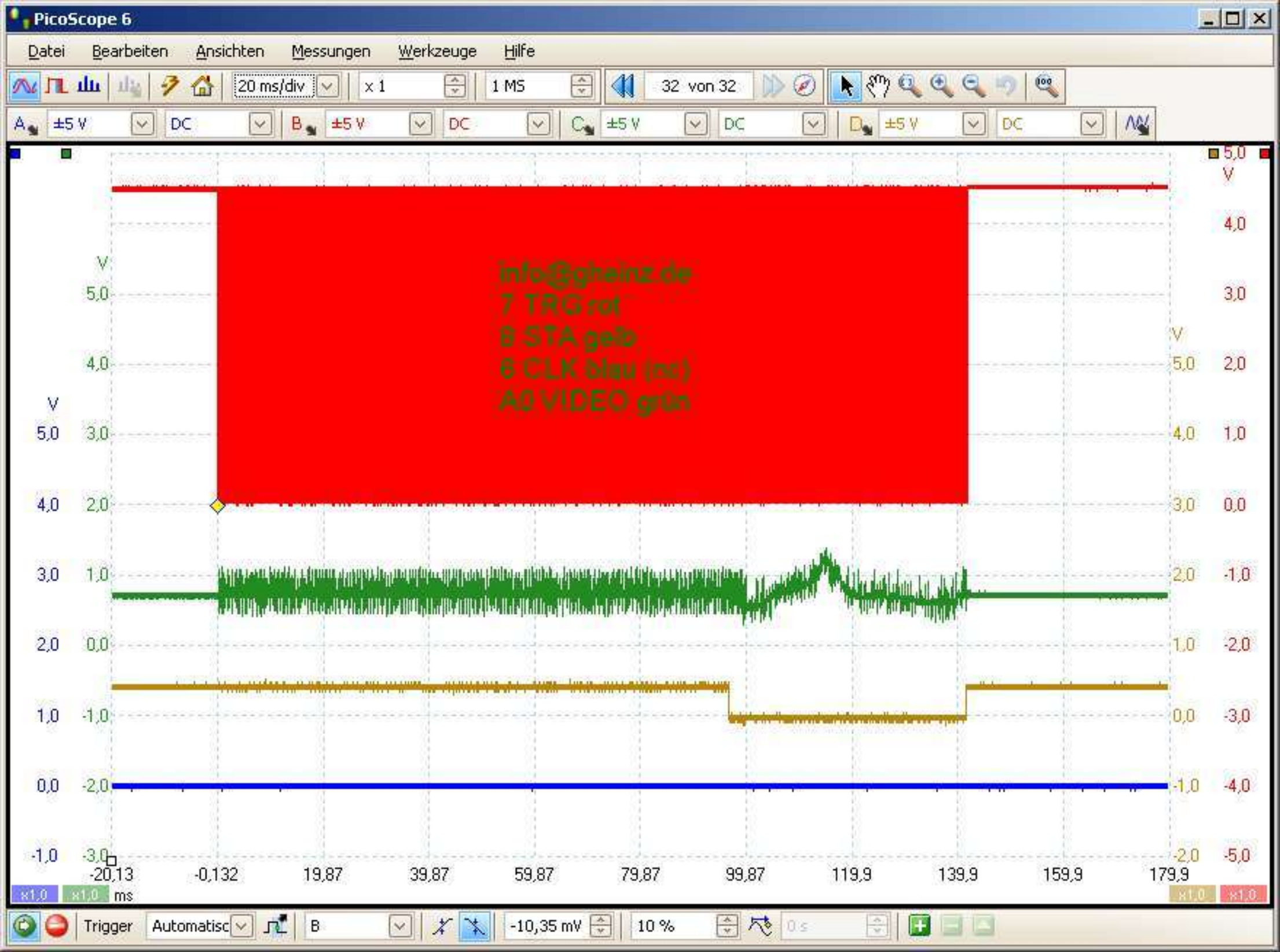

C12880MA
www.gheinz.de
HOLE
BU2
BU1
STA
TRG
nc
CLK
GND
VDD
END
OUT
1
2
3
4
5
6
7
8
9
10

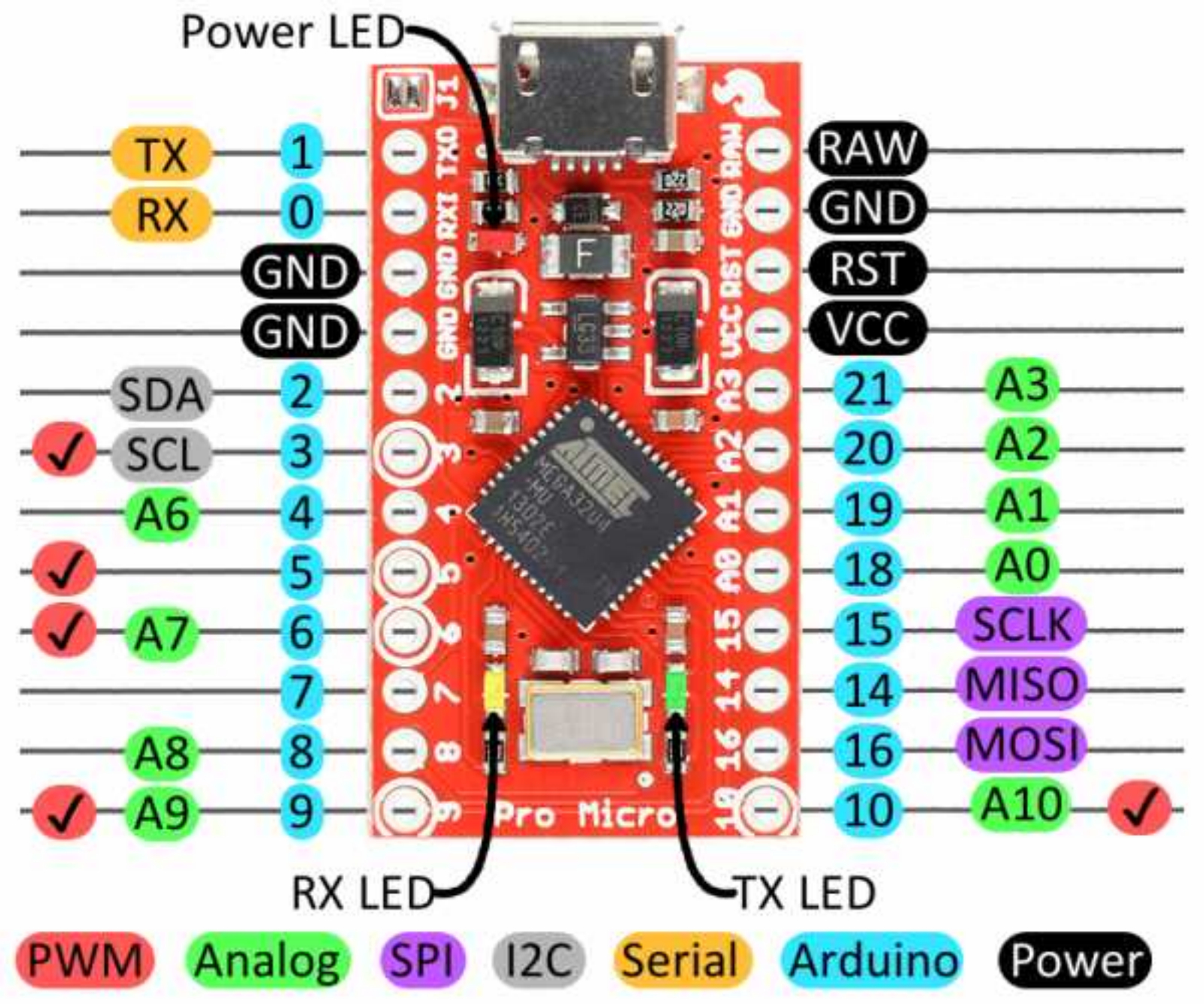


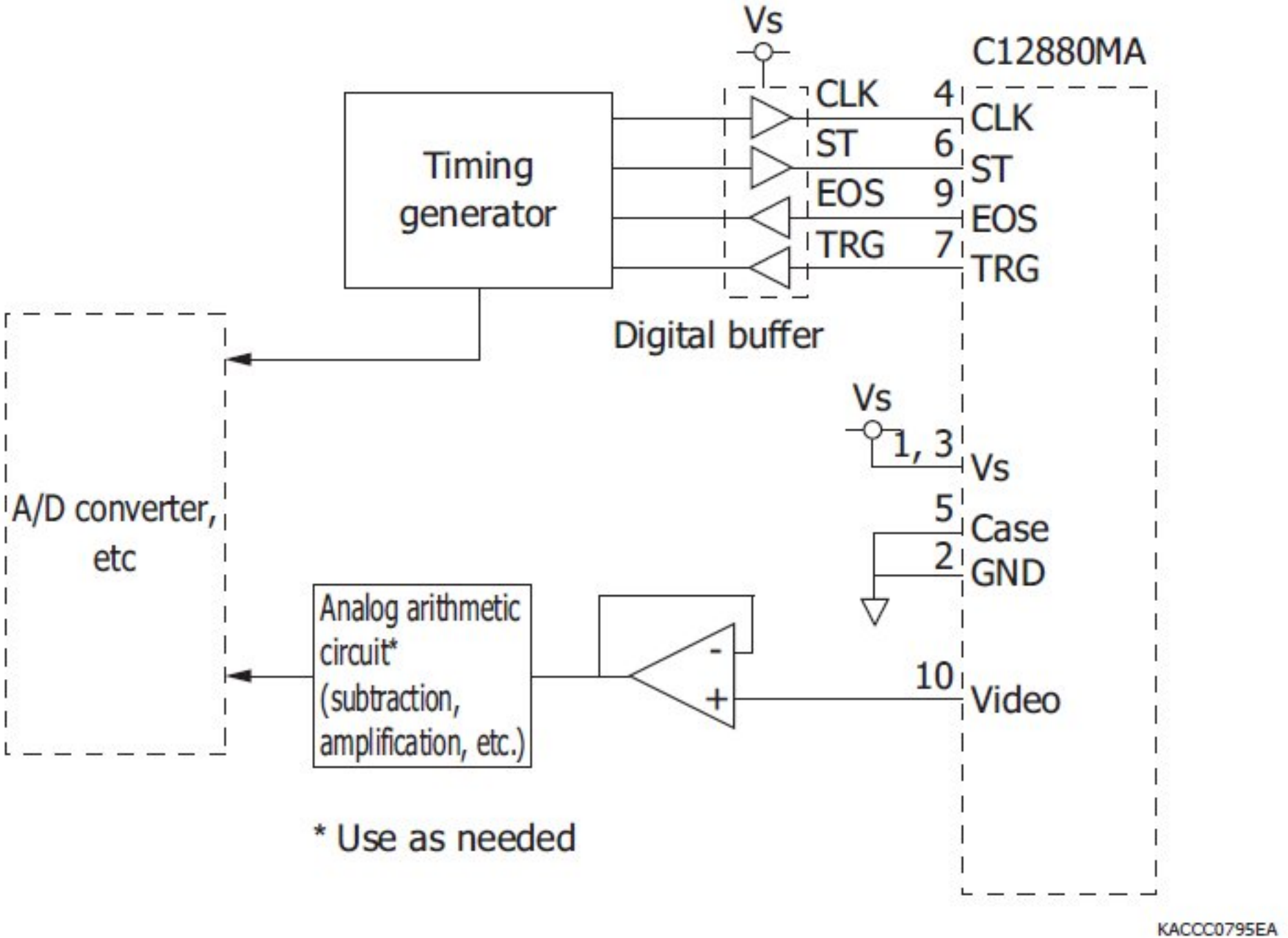
Title: Adapter für Microspectrometer Hamamatsu C12880MA		
Size: A	Document Number: www.gheinz.de	Rev: 1
Date: Wednesday, May 11, 2016	Sheet 1 of 1	


Spectrometer_C12880MA
ADCmax 665.0
ADCmin 157.0
www.gheinz.de
h: help-menue on/off
a: moving average
t: test-marker
s: scale
d: debug to console
Spektrum Sonne im Zimmer
400
500
600
700
800
nm
900

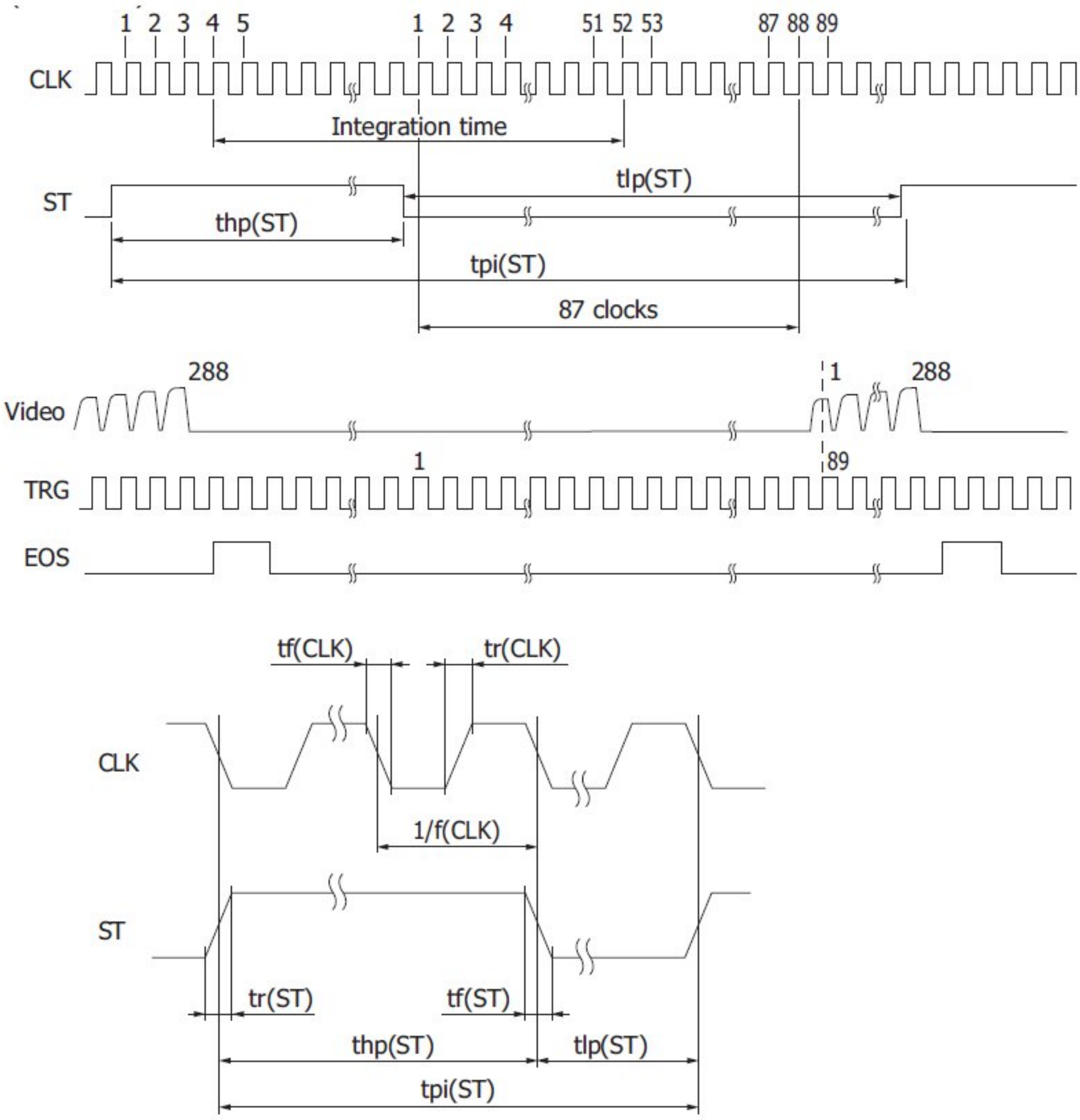

Spectrometer_C12880MA
ADCmax 1001.0
ADCmin 151.0
www.gheinz.de
h: help-menue on/off
a: moving average
t: test-marker
s: scale
d: debug to console
Spektrum Geldprüflampe
400
500
600
700
800
nm
900


PicoScope 6
Datei
Bearbeiten
Ansichten
Messungen
Werkzeuge
Hilfe
20 ms/div
x 1
1 MS
32 von 32
A
±5 V
DC
B
±5 V
DC
C
±5 V
DC
D
±5 V
DC
info@gheinz.de
7 TRG rot
8 STA gelb
6 CLK blau (nc)
A0 VIDEO grün
V
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
-2,0
-3,0
-20,13
-0,132
19,87
39,87
59,87
79,87
99,87
119,9
139,9
159,9
179,9
ms
Trigger
Automatisc
B
-10,35 mV
10 %


Power LED
TX
RX
GND
GND
SDA
SCL
A6
A7
A8
A9
1
0
2
3
4
5
6
7
8
9
RAW
GND
RST
VCC
21
20
19
18
15
14
16
10
A3
A2
A1
A0
SCLK
MISO
MOSI
A10
Pro Micro
RX LED
TX LED
PWM
Analog
SPI
I2C
Serial
Arduino
Power


Vs
C12880MA
CLK
4
CLK
ST
6
ST
EOS
9
EOS
TRG
7
TRG
Timing generator
Digital buffer
Vs
1, 3
Vs
5
Case
2
GND
A/D converter, etc
Analog arithmetic circuit* (subtraction, amplification, etc.)
-
+
10
Video
* Use as needed
KACCC0795EA

Timing chart



KACCC0771EA

Parameter	Symbol	Min.	Typ.	Max.	Unit
Start pulse cycle*11	tpi(ST)	381/f(CLK)	-	-	s
Start pulse high period*12	thp(ST)	6/f	-	-	s
Start pulse low period	tlp(ST)	375/f	-	-	s
Start pulse rise and fall times	tr(ST), tf(ST)	0	10	30	ns
Clock pulse duty	-	45	50	55	%
Clock pulse rise and fall times	tr(CLK), tf(CLK)	0	10	30	ns

*11: The shortest period required to output the video signals from all pixels.
*12: The integration time equals the high period of ST plus 48 CLK cycles.
The shift register starts operation at the rising edge of CLK immediately after ST goes low.
The integration time can be changed by changing the ratio of the high and low periods of ST.
If the first TRG pulse after ST goes low is counted as the first pulse, the Video signal should be acquired at the rising edge of th
89th TRG pulse.

Operation example

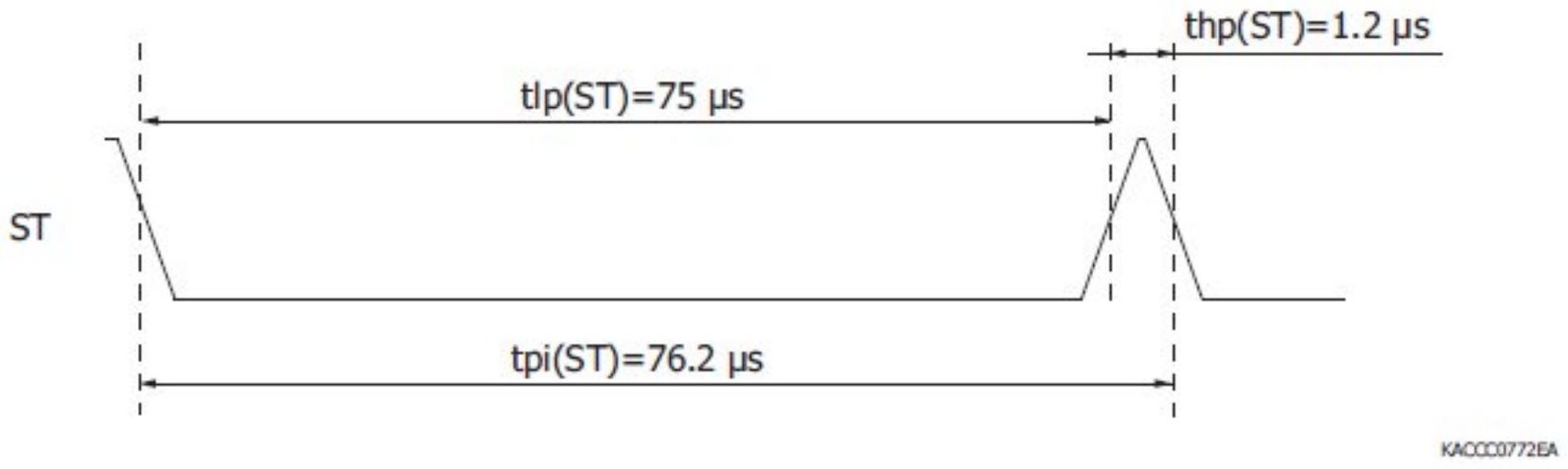
This is an operating example when the clock pulse frequency is set to maximum (video data rate is also set to maximum), the time per scan to minimum, and the integration time to maximum.

· Clock pulse frequency [f(CLK)] = Video data rate
= 5 MHz

· Start pulse cycle [tpi(ST)] = 381/f(CLK)
= 381/5 MHz
= 76.2 µs

· Low period of start pulse min. [tlp(ST)] = 375/f(CLK)
= 375/5 MHz
= 75 µs

· High period of start pulse [thp(ST)] = Start pulse cycle [tpi(ST)] - Low period of start pulse min. [tlp(ST)]
= 76.2 µs - 75 µs
= 1.2 µs



Integration time is equal to the high period of start pulse + 48 cycles of clock pulses, so it will be 1.2 µs + 9.6 µs = 10.8 µs.

UART-logfile
on Port COM87 115200 Baud, 1n8n

_____

Port available: COM87

data.length was 288; form: i_data_hma;
data maximum 351.0; data minimum 118.0; delta 233.0; window height 300; scalefactor 1.2875537
Automatic Gain Control value sent to ProMicro: 0
ProMicros answer is:

[data]
Received: 0
new INTEGTIME = 4

data.length was 288; form: i_data_hma;
data maximum 348.0; data minimum 118.0; delta 230.0; window height 300; scalefactor 1.3043479
Automatic Gain Control value sent to ProMicro: 0
ProMicros answer is:

[data]
Received: 0
new INTEGTIME = 4

////////////////////// mit debug-Ausgaben /////////////////

[data]
Received: 0
new INTEGTIME = 6

Taste d gedrückt
1_150_149; 2_153_153; 3_151_151; 4_153_154; 5_156_156; 6_156_156; 7_157_158; 8_159_159; 9_160_160; 10_160_160; 11_165_166; 12_160_160; 13_163_162; 14_160_161; 15_159_158; 16_160_161; 17_162_162; 18_170_170; 19_168_169; 20_170_171; 21_178_179; 22_189_190; 23_194_194; 24_202_202; 25_204_205; 26_211_211; 27_216_216; 28_213_214; 29_217_217; 30_219_219; 31_214_214; 32_211_211; 33_211_212; 34_205_207; 35_208_210; 36_215_216; 37_211_210; 38_217_219; 39_213_214; 40_221_221; 41_225_225; 42_224_226; 43_225_226; 44_226_226; 45_233_233; 46_229_228; 47_225_225; 48_231_232; 49_233_233; 50_230_231; 51_239_238; 52_238_238; 53_239_240; 54_237_238; 55_231_232; 56_224_226; 57_230_230; 58_230_231; 59_231_230; 60_225_227; 61_223_224; 62_227_227; 63_222_223; 64_225_226; 65_218_219; 66_217_217; 67_214_214; 68_209_212; 69_211_213; 70_215_216; 71_211_213; 72_215_214; 73_216_217; 74_210_211; 75_214_215; 76_209_210; 77_211_213; 78_214_214; 79_212_211; 80_213_214; 81_210_211; 82_206_206; 83_210_212; 84_221_221; 85_214_215; 86_211_211; 87_209_209; 88_215_215; 89_208_209; 90_209_209; 91_204_204; 92_207_208; 93_205_205; 94_204_204; 95_206_206; 96_206_205; 97_204_205; 98_203_203; 99_202_202; 100_212_212; 101_212_213; 102_204_206; 103_202_202; 104_203_204; 105_196_197; 106_199_199; 107_204_204; 108_198_199; 109_197_196; 110_196_196; 111_194_194; 112_198_198; 113_194_195; 114_193_194; 115_199_199; 116_197_198; 117_198_198; 118_199_199; 119_199_200; 120_201_202; 121_198_199; 122_196_196; 123_189_190; 124_182_183; 125_181_181; 126_180_181; 127_175_176; 128_177_177; 129_182_182; 130_176_178; 131_178_177; 132_174_174; 133_177_178; 134_182_182; 135_173_173; 136_174_175; 137_176_177; 138_177_176; 139_175_177; 140_171_171; 141_172_173; 142_176_177; 143_170_171; 144_171_171; 145_169_169; 146_172_171; 147_173_172; 148_169_169; 149_169_168; 150_174_175; 151_169_168; 152_173_173; 153_174_173; 154_172_172; 155_170_170; 156_175_175; 157_174_175; 158_174_174; 159_173_174; 160_174_175; 161_179_179; 162_174_173; 163_174_174; 164_172_173; 165_171_172; 166_182_182; 167_173_174; 168_180_180; 169_173_173; 170_175_176; 171_178_178; 172_178_178; 173_176_176; 174_182_182; 175_180_181; 176_180_180; 177_176_177; 178_178_178; 179_186_185; 180_181_181; 181_177_177; 182_178_178; 183_176_176; 184_177_177; 185_171_170; 186_167_168; 187_168_168; 188_163_163; 189_165_166; 190_171_172; 191_163_163; 192_176_176; 193_168_168; 194_168_168; 195_177_177; 196_172_171; 197_174_173; 198_173_174; 199_171_172; 200_168_168; 201_168_169; 202_170_169; 203_172_171; 204_167_167; 205_169_170; 206_168_168; 207_169_169; 208_170_170; 209_166_167; 210_165_165; 211_166_166; 212_166_166;

```
213_166_166; 214_166_167; 215_164_164; 216_164_165; 217_159_160; 218_168_168;
219_163_163; 220_158_159; 221_160_160; 222_159_159; 223_164_165; 224_157_158;
225_159_159; 226_161_161; 227_158_159; 228_158_158; 229_163_163; 230_161_160;
231_163_163; 232_159_159; 233_161_161; 234_159_159; 235_161_160; 236_156_156;
237_157_157; 238_158_158; 239_157_158; 240_156_156; 241_158_158; 242_162_162;
243_159_159; 244_157_158; 245_156_157; 246_153_154; 247_156_156; 248_161_161;
249_160_161; 250_161_161; 251_164_164; 252_159_159; 253_153_153; 254_156_157;
255_154_154; 256_154_154; 257_157_157; 258_159_159; 259_156_155; 260_154_154;
261_155_156; 262_160_160; 263_157_157; 264_154_154; 265_151_152; 266_152_153;
267_158_158; 268_165_164; 269_158_158; 270_155_156; 271_157_157; 272_157_158;
273_158_158; 274_158_159; 275_159_159; 276_202_202; 277_203_203; 278_204_204;
279_203_203; 280_204_204; 281_203_203; 282_204_204; 283_203_203; 284_204_204;
285_204_203; 286_204_204; 287_203_203; 288_0_0;
data.length was 288; form: i_data_hma;
moving average maximum = 0.80329996
AGC number of peaks = 1
AGC sent to ProMicro: +

incomming rest from ProMicro begin:

[data]
Received: +
new INTEGTIME = 200

end incomming from ProMicro.

...

```