Solar_Power_Meter_ESP32_INA219_OLED-SH1106_v360 my_IoT_credentials.h

```
float SW_version = 3.60;

/*
  ' ######################################################################
  ' ###
  ' ###       *** Solar Power-Meter with ESP32 Pico-Kit v4 and INA219 ***
  ' ###       ----------------------------------------------------------
  ' ###       *Wolfgang Franke*
  ' ###       Projekt v1.0: 01. July 2019 - 10. July 2019 (Prototype Software)
  ' ###       Software-Version 1.50    (used IDE: Arduino v1.8.9)
  ' ###       Projekt v1.6: 10. Aug 2019 - 11. Aug 2019 (Arduino Hardware+Software)
  ' ###       Software-Version 1.60    (used IDE: Arduino v1.8.9)
  ' ###       Projekt v2.0: 10. Jan 2020 - 11. Jan 2020 (port to ESP32 Hardware+SW)
  ' ###       Software-Version 2.0x    (used IDE: Arduino v1.8.10)
  ' ###       Projekt v3.0: 11. Jan 2020 - 19. Jan 2020 (added Wifi+IoT in ESP32 Software)
  ' ###       Software-Version 3.4x    (used IDE: Arduino v1.8.10)
  ' ###       Projekt v3.5: 08. Feb 2020 - 09. Feb 2020 (added NTP in ESP32 Software)
  ' ###       Software-Version 3.5x    (used IDE: Arduino v1.8.10)
  ' ###       Projekt v3.6: 25. Feb 2020 - 26. Feb 2020 (added corrected ADC in ESP32 Software)
  ' ###       Software-Version 3.6x    (used IDE: Arduino v1.8.10)
  ' ###       ----------------------------------------------------------
  ' ###
  ' ###       Hardware Setup:
  ' ###           + ESP32 Pico-Kit v4 (5V Micro-USB, intern 3,3V, 80 MHz, 4MB Flash)
  ' ###           + OLED 1,3" SH1106 128x64 (I2C Address: 0x3C) with U8g2lib Library
  ' ###           + INA219 Shunt-Voltage meter (I2C Addresses: 0x40-0x4F) using own I2C Module selection routines
  ' ###           + LED to signal WiFi status (L-active)
  ' ###
  ' ###       Software capabilities:
  ' ###       --v1.5/1.6 functions on Arduino Nano:
  ' ###       (1) measure the Current, Voltage, Power and Energy produced by a Solar Panel (connected via a Shunt resistor to the load)
  ' ###             - Solar Panel:  up to 24V, 20W (max 1A)
  ' ###             - INA219 cartridges: using 6 INA219 cartridge with different Shunt resistors and each having an own I2C address
  ' ###       (2) INA219 measures Shunt Voltage , will be displayed on OLED
  ' ###             - measurement loop: sum up the Energy (U*I*time) in 1s intervals (Integral of Power over time in Ws) and display as Energy in Wh,
  ' ###             - INA219 Cartridge hot-swap: before every measure determine the INA2019 module (shunt, volt) by I2C address
  ' ###             - INA219 auto-select PGA/GainDiv: before every measure determine the PGA/GainDiv with highes ADC-resolution in INA219
  ' ###             - INA219 config: V-Shunt-max = 40-80-160-320mV (PGA/ainDiv) ; V-Bus=32V ; ADC=12bit ; Single Conversation, Continuous Mode, but no calibration,
  ' ###             - INA219 used to measure Shunt and Bus Voltage only, but then current, power, energy (current/max/day) are calculated based on used Shunt,
  ' ###             - the INA219 internal calculation and calibration of current and power is not used here,
  ' ###       (3) Auto-Reset data over night (darkness of x hours)
  ' ###             - reset max current/power and day energy,
  ' ###             - after day change, keep last day's value on display,
  ' ###
  ' ###       --v2.0 changes from Arduino to ESP32:
  ' ###             - 1s interval more precise: use a ESP32 Timer-INT to generate the 1 sec interval for main loop (with Arduino was a trimmed/hacked 1s in the main loop)
  ' ###             - ADC: ESP32 ADC default is 12bit ADC, using a 3,3V reference, with R1/R2=10k/10k (Arduino was 10bit; 1,1V internal reference; R1/R2=4,7k/800R)
  ' ###             - delay() function removed: for WiFi config process a non blocking delay (useing millies) is used, in all other cases using ESP32's vTaskDelay(ms/portTICK_PERIOD_MS) , not Arduino delay() anymore;
  ' ###             - externalized the private credentials to ".h" file
  ' ###
  ' ###       --v3.0 additional features using ESP32 capabilities:
  ' ###
  ' ###       (4) WiFi connectivity implemented by using IotWebConf library for ESP8266/ESP32
  ' ###             - IotWebConf library allows to dynamically enter the WiFi config by Web interface, no need anymore to store SSID and PW in source code
  ' ###             - Source: Arduino Library Manager, or https://github.com/prampec/IotWebConf (author: Balázs Kelemen)
  ' ###             - it's a non blocking WiFi/AP web configuration library for Arduino, no reboot to switch WiFi settings,
  ' ###             - supports a WiFi connection status LED, and a Switch to open an AP at power-on to config WiFi,
  ' ###             - Bug: the version IotWebConf v2.3.1 does only support WiFi passwords of <33 characters,
  ' ###                 patch: modify in IotWebConf.h to line  #define IOTWEBCONF_PASSWORD_LEN 65  (was 33)
  ' ###             - FYI: in case of WiFi-AP connection issues in test-phase of your scetch, then manually delete the first byte of EEPROM to invalidate the WiFi config,
  ' ###
  ' ###       (5) IoT Cloud: ThingSpeak analytic IoT platform service (https://www.thingspeak.com)
  ' ###             - Source: Arduino Library Manager, or https://github.com/mathworks/thingspeak-arduino
  ' ###             - sending 4 data items and Status to a channel in ThingSpeak cloud, by WebClient with HTTP-GET
  ' ###             - setting a time interval to send data (around every 10-15 min (600/900s), data items are float (mA, V, max-W, Wh-day) and string (status)
  ' ###
  ' ###       --v3.5 additional features using NTP capabilities:
  ' ###
  ' ###       (6) NTP support implemented by using Arduino (ESP32) library for ESP32
  ' ###             - Arduino (ESP32) Time library gets time from NTP servers (up to 3 can be defined), translates to local time, and set ESP32 RTC,
  ' ###             - Source: default Arduino (ESP32) library
  ' ###             - if NTP available, then reset daily values at midnight (trigger at 23:59:55), otherwise reset current day's values after detecting some hours of darkness,
  ' ###             - NTP/RTC time re-synch, daily 04:00:00 a.m. synch MCU time with NTP Server, and send NTP-status to ThingSpeak status,
  ' ###
  ' ###       --v3.6 additional features to measure an alternative Voltage (e.g. a Solar or Battery Voltage) using ESP32 ADC:
  ' ###
  ' ###       (7) ADC sub-routine for simple correction of non-linearity in ESP32 ADC measure curve (no correction for the unpreciseness of ESP32 internal U-Ref)
  ' ###             - issue: ESP32 ADC curve is very non-linear (up to -25%), and internal reference voltage of 1,1V can range from 1,0V to 1,2V (issue doc: esp32.com/viewtopic.php?f=19&t=2881)
  ' ###             - Source: github.com/G6EJD/ESP32-ADC-Accuracy-Improvement-function/blob/master/ESP32_ADC_Read_Voltage_Accurate.ino
  ' ###             - re-calc ADC readings with some polynomial correction, achieves good ±2% in mid range volt, but still >10% near 0 and near 4095
  ' ###
  ' ###       (x) known limitations:
  ' ###         - Time interval for data upload to ThingSpeak (every 15 min) is not synched to NTP time triggered reset of daily max-values (00:00), means losing the maxima occuring <15 minutes before NTP reset (not an issue for measureing solar power)
  ' ###         - the nightly reset of current day's values by detecting some hours of darkness (no NTP), should have a hysteresis, e.g. x hours with 0,y mA will reset at night, and 10 mA will wake up and starts the day,
  ' ###         - FYI only: after darkness has reset the max/day values, the counter Darkness_Counter_sec keeps incrementing a long-var, until the next daylight resets it,
  ' ###
  ' ######################################################################
```

```
' ######################################################################
' ###  Pinbelegungen
' ###  -----------------------------------------------------------------
' ###  Arduino      ATMega328P        ESP32 PicoKitv4   external circuit
' ###  Nano                                             Beschaltung_WF
' ###  -----------------------------------------------------------------
' ###  V-In/RAW     -                                   not used, disabled in Arduino Nano
' ###  3,3V         -                                   not used, Arduino Vout=3,3V (I-out<100mA?)
' ###  5V           -                                   5V+=V-USB=VCC, removed internal Diode in Arduino Nano allows use of full 5V+ from V-USB
' ###  Vcc          (07)                                5V+ = V-USB
' ###  Vcc          (20)                                5V+ = V-USB
' ###  GND          (08)                                GND
' ###  GND          (22)                                GND
' ###
' ###                                 5V                USB power for ESP32 Module
' ###                                 3,3V              3,3V=VCC for ESP32-Chip, OLED and INA219 on I2C
' ###
' ###
' ###  A0           (21)              ADC1_CH6=GPIO-34  measures VCC (ESP32: via 10k/10k against URef=3,3V ; Arduino: via 4,7k/800 against URef=1,1V)
' ###                                 ADC1_CH7=GPIO-35  measures V-Solar (ESP32: via 10k/100k to GND, against URef=3,3V)
' ###  A4/SDA       (27)PC4           GPIO-21           I2C-SDA (external Pull-Up 10k to Vcc=5V)
' ###  A5/SCL       (28)PC5           GPIO-22           I2C-SCL (external Pull-Up 10k to Vcc=5V)
' ###                                 GPIO-14           LED to VCC, used by IotWebConf library on runtime to indicated WiFi connection status
' ###                                 GPIO-27           Switch to GND (not soldered in), used by IotWebConf library on startup to open AP with SSID+PW from source code
' ###
' ###  RESET        (01)              EN                onboard Reset-Button to GND, with onboard 10k Pull-Up
' ###                                 GPIO-0            onboard Boot-Button to GND, with external 10k Pull-Up (onboard on PicoKit v4.1)
' ###                                 GPIO-13           RTS for programming
' ###                                 GPIO-15           CTS for programming
' ###                                 GPIO-34..39       FYI: Input only
' ###
' ######################################################################
```

INA219
Meßbereiche

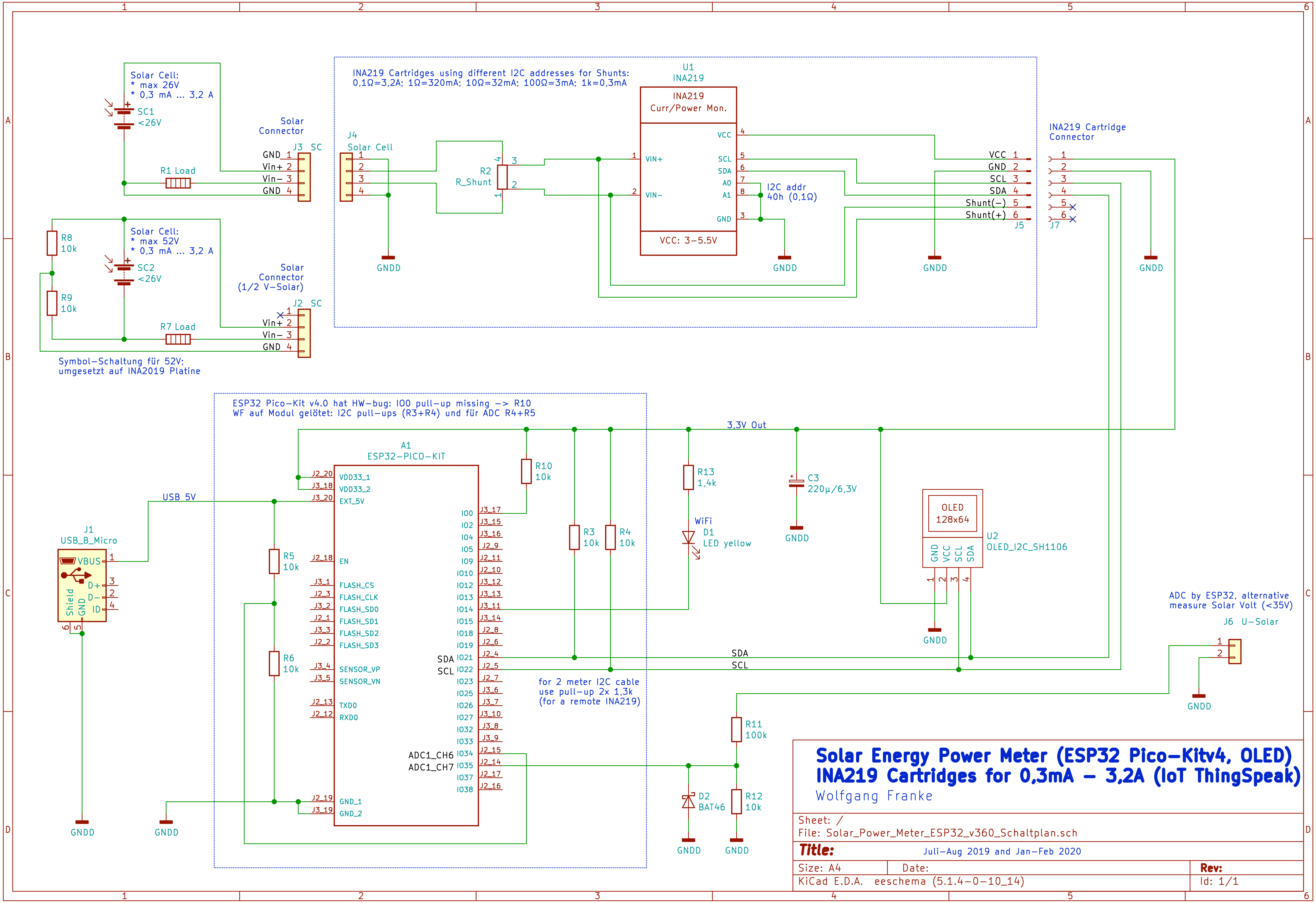
Shunt je Cartridge (0,1-1000)
Auto PGA/GainDiv umschalten von 40/80/320/160mV

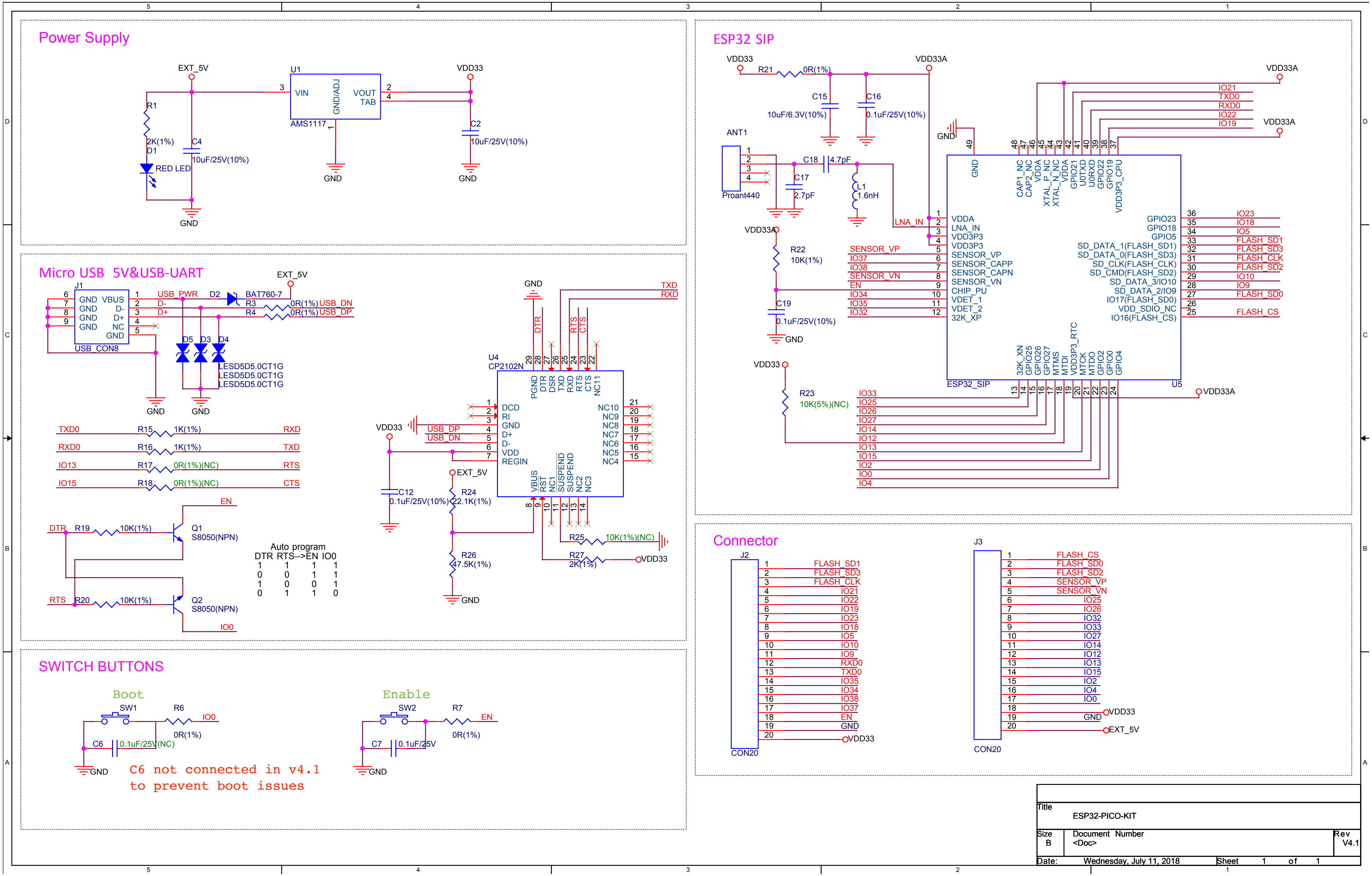
Shunt Ohm	I2C Adresse	Remark
0,01	not used	
0,1	**0x40**	
1	**0x41**	
10	**0x44**	
100	**0x45**	
1.000	**0x46**	
0,1	**0x4F**	mit ½ V-Solar
open shunt	not used	

mV	Gain-Div
40	1
80	2
160	4
320	8

Shunt-Stecker 3-polig		INA219-Stecker verpolsicher	
GND	1	Vcc	1
Shunt(Vin+)	2	GND	2
Shunt(Vin-)	3	I2C-SDL	3
GND	4	I2C-SDA	4
		Solar Vin-	nc
Umax = 26V !!!		Solar Vin+	nc

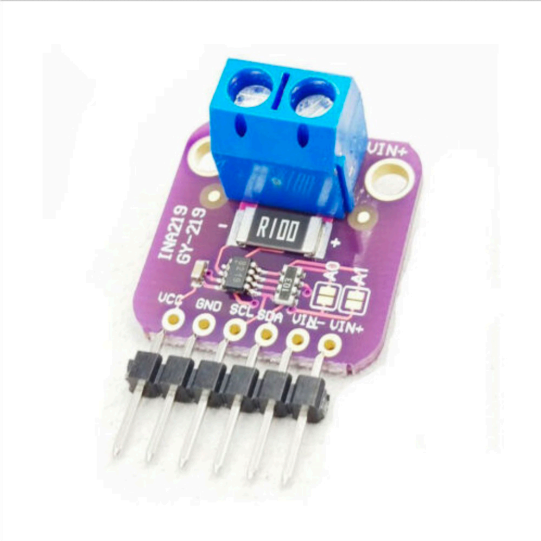
		Shunt Ohm	U-max mV	I-max mA	ADC-res=µA	OLED Display
		0,1	320	3.200	781	
		0,1	160	1.600	391	>=10mA: yyy (mA)
	max. 3A	0,1	80	800	195	<10mA: y.x (mA)
Lieferung CN1	**0x40**	0,1	40	400	98	<1mA: y.xxx (mA)
		1,0	320	320	78	
		1,0	160	160	39	>=10mA: yyy (mA)
	max. 0,3A	1,0	80	80	20	<10mA: y.x (mA)
	0x41	1,0	40	40	10	<1mA: y.xxx (mA)
		10	320	32	7,8	
		10	160	16	3,9	>=10mA: yy (mA)
	max. 30mA	10	80	8	2,0	<10mA: y.x (mA)
Lieferung DE	**0x44**	10	40	4	1,0	<1mA: y.xxx (mA)
		100	320	3	0,8	
		100	160	2	0,4	
	max. 3mA	100	80	0,8	0,2	
	0x45	100	40	0,4	0,1	always: y.xxx (mA)
		1000	320	0,3	0,078	
		1000	160	0,2	0,039	
	max. 0,3mA	1000	80	0,1	0,020	
	0x46	1000	40	0,0	0,010	always: y.xxx (mA)


Solar Cell:
* max 26V
* 0,3 mA ... 3,2 A
SC1
<26V
Solar Connector
J3 SC
GND 1
Vin+ 2
Vin- 3
GND 4
R1 Load
R8
10k
R9
10k
Solar Cell:
* max 52V
* 0,3 mA ... 3,2 A
SC2
<26V
Solar Connector (1/2 V-Solar)
J2 SC
Vin+ 2
Vin- 3
GND 4
R7 Load
Symbol-Schaltung für 52V; umgesetzt auf INA2019 Platine
INA219 Cartridges using different I2C addresses for Shunts:
0,1Ω=3,2A; 1Ω=320mA; 10Ω=32mA; 100Ω=3mA; 1k=0,3mA
J4
Solar Cell
R2
R_Shunt
GNDD
U1
INA219
INA219
Curr/Power Mon.
VCC
VIN+
VIN-
SCL
SDA
A0
A1
GND
I2C addr
40h (0,1Ω)
VCC: 3-5.5V
INA219 Cartridge Connector
VCC 1
GND 2
SCL 3
SDA 4
Shunt(-) 5
Shunt(+) 6
J5
J7
ESP32 Pico-Kit v4.0 hat HW-bug: IO0 pull-up missing -> R10
WF auf Modul gelötet: I2C pull-ups (R3+R4) und für ADC R4+R5
3,3V Out
A1
ESP32-PICO-KIT
VDD33_1
VDD33_2
EXT_5V
EN
FLASH_CS
FLASH_CLK
FLASH_SD0
FLASH_SD1
FLASH_SD2
FLASH_SD3
SENSOR_VP
SENSOR_VN
TXD0
RXD0
GND_1
GND_2
IO0
IO2
IO4
IO5
IO9
IO10
IO12
IO13
IO14
IO15
IO18
IO19
SDA IO21
SCL IO22
IO23
IO25
IO26
IO27
IO32
IO33
ADC1_CH6 IO34
ADC1_CH7 IO35
IO37
IO38
R10
10k
R3
10k
R4
10k
R13
1,4k
WiFi
D1
LED yellow
C3
220µ/6,3V
OLED
128x64
U2
OLED_I2C_SH1106
GND
VCC
SCL
SDA
USB 5V
J1
USB_B_Micro
VBUS
D+
D-
ID
Shield
GND
R5
10k
R6
10k
SDA
SCL
for 2 meter I2C cable
use pull-up 2x 1,3k
(for a remote INA219)
ADC by ESP32, alternative
measure Solar Volt (<35V)
J6 U-Solar
R11
100k
R12
10k
D2
BAT46
Solar Energy Power Meter (ESP32 Pico-Kitv4, OLED)
INA219 Cartridges for 0,3mA - 3,2A (IoT ThingSpeak)
Wolfgang Franke
Sheet: /
File: Solar_Power_Meter_ESP32_v360_Schaltplan.sch
Title:
Date: Juli-Aug 2019 and Jan-Feb 2020
Size: A4
Rev:
KiCad E.D.A. eeschema (5.1.4-0-10_14)
Id: 1/1

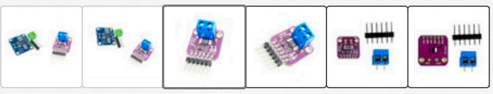


Power Supply
EXT_5V
U1
VIN
GND/ADJ
VOUT
TAB
AMS1117
VDD33
R1
2K(1%)
D1
RED LED
C4
10uF/25V(10%)
C2
10uF/25V(10%)
GND
Micro USB 5V&USB-UART
J1
USB_CON8
USB_PWR
D2
BAT760-7
R3
R4
0R(1%)
USB_DN
USB_DP
D5
D3
D4
LESD5D5.0CT1G
TXD0
R15
1K(1%)
RXD
RXD0
R16
TXD
IO13
R17
0R(1%)(NC)
RTS
IO15
R18
CTS
DTR
R19
10K(1%)
Q1
S8050(NPN)
EN
R20
Q2
IO0
Auto program
DTR RTS-->EN IO0
1 1 1 1
0 0 1 1
1 0 0 1
0 1 1 0
U4
CP2102N
DCD
RI
GND
D+
D-
VDD
REGIN
VBUS
RST
SUSPEND
C12
0.1uF/25V(10%)
R24
22.1K(1%)
R26
47.5K(1%)
R25
10K(1%)(NC)
R27
2K(1%)
SWITCH BUTTONS
Boot
SW1
R6
0R(1%)
C6
0.1uF/25V(NC)
Enable
SW2
R7
C7
0.1uF/25V
C6 not connected in v4.1
to prevent boot issues
ESP32 SIP
VDD33A
R21
0R(1%)
C15
10uF/6.3V(10%)
C16
0.1uF/25V(10%)
ANT1
Proant440
C18
4.7pF
C17
2.7pF
L1
1.6nH
LNA_IN
R22
10K(1%)
C19
0.1uF/25V(10%)
R23
10K(5%)(NC)
ESP32_SIP
U5
VDDA
LNA_IN
VDD3P3
SENSOR_VP
SENSOR_CAPP
SENSOR_CAPN
SENSOR_VN
CHIP_PU
VDET_1
VDET_2
32K_XP
GPIO23
GPIO18
GPIO5
SD_DATA_1(FLASH_SD1)
SD_DATA_0(FLASH_SD3)
SD_CLK(FLASH_CLK)
SD_CMD(FLASH_SD2)
SD_DATA_3/IO10
SD_DATA_2/IO9
IO17(FLASH_SD0)
VDD_SDIO_NC
IO16(FLASH_CS)
Connector
J2
CON20
J3
FLASH_CS
FLASH_SD0
FLASH_SD1
FLASH_SD2
FLASH_SD3
FLASH_CLK
SENSOR_VP
SENSOR_VN
EXT_5V
Title
ESP32-PICO-KIT
Size
B
Document Number
<Doc>
Rev
V4.1
Date: Wednesday, July 11, 2018
Sheet 1 of 1

Das nachfolgende Angebot wurde vom Verkäufer aktualisiert, aber Sie können trotzdem den von Ihnen gekauften Artikel aufrufen.



Zum Heranzoomen mit der Maus über das Bild fahren



GY-219 INA219 I2C Bi-directional DC Current Power Supply Sensor Module Breakout

Artikelzustand: **Neu**

Color:: Purple

Anzahl: 1 | 5 verfügbar | 288 verkauft / Bewertungen ansehen

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Product Description

Purple
This breakout board will solve all your power-monitoring problems. Instead of struggling with two multimeters, you can just use the handy INA219B chip on this breakout to both measure both the high side voltage and DC current draw over I2C with 1% precision.Most current-measuring devices such as our current panel meter are only good for low side measuring. That means that unless you want to get a battery involved, you have to stick the measurement resistor between the target ground and true ground. This can cause problems with circuits since electronics tend to not like it when the ground references change and move with varying current draw. This chip is much smarter - it can handle high side current measuring, up to +26VDC, even though it is powered with 3 or 5V. It will also report back that high side voltage, which is great for tracking battery life or solar panels.
A precision amplifier measures the voltage across the 0.1 ohm, 1% sense resistor. Since the amplifier maximum input difference is ±320mV this means it can measure up to ±3.2 Amps. With the internal 12 bit ADC, the resolution at ±3.2A range is 0.8mA. With the internal gain set at the minimum of div8, the max current is ±400mA and the resolution is 0.1mA. Advanced hackers can remove the 0.1 ohm current sense resistor and replace it with their own to change the range (say a 0.01 ohm to measure up 32 Amps with a resolution of 8mA)
We include a 6-pin header (so you can easily attach this sensor to a breadboard) as well as a 3.5mm terminal plug so you can easily attach and detach your load. Usage is simple. Power the sensor itself with 3 to 5VDC and connect the two I2C pins up to your microcontroller. Then connect your target power supply to VIN+ and the load to ground to VIN-. We have an Arduino library right now that will do all the gain, range and math for you - just plug and go! We'll have a more detailed tutorial up shortly.
Specification:
Uses the INA219B chip
0.1 ohm 1% 2W current sense resistor
Up to +26V target voltage
Up to ±3.2A current measurement, with ±0.8mA resolution
This board ip uses I2C 7-bit addresses 0x40, 0x41, 0x44, 0x45, selectable with jumpers
Package Included:1 X INA219 GY-219 Bi-direction DC Current Power Supply Breakout Sensor

Blue
NA219 can be achieved within the maximum error accuracy 85C temperature range from -40C to + 1% , the maximum offset is 100 uV.
The high-precision products combine the advantages of 12-bit resolution.
This module can be sensed bus voltage range is 0 V to +26 V.
Features:
Package:SOT23
Working Voltage 3~5V
Size:25.5 x 22.3mm
Used for I2C port zero drift / bidirectional current / power monitoring sensor module
Package Included:1 x SOT23 INA219 Bi-directional DC Current Power Supply Sensor Breakout Module DIY