

# Kernel driver ina2xx

Supported chips:

- Texas Instruments INA219  
Prefix: 'ina219' Addresses: I2C 0x40 - 0x4f  
Datasheet: Publicly available at the Texas Instruments website  
<https://www.ti.com/>
- Texas Instruments INA220  
Prefix: 'ina220'  
Addresses: I2C 0x40 - 0x4f  
Datasheet: Publicly available at the Texas Instruments website  
<https://www.ti.com/>
- Texas Instruments INA226  
Prefix: 'ina226'  
Addresses: I2C 0x40 - 0x4f  
Datasheet: Publicly available at the Texas Instruments website  
<https://www.ti.com/>
- Texas Instruments INA230  
Prefix: 'ina230'  
Addresses: I2C 0x40 - 0x4f  
Datasheet: Publicly available at the Texas Instruments website  
<https://www.ti.com/>
- Texas Instruments INA231  
Prefix: 'ina231'  
Addresses: I2C 0x40 - 0x4f  
Datasheet: Publicly available at the Texas Instruments website  
<https://www.ti.com/>

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## Description

The INA219 is a high-side current shunt and power monitor with an I2C interface. The INA219 monitors both shunt drop and supply voltage, with programmable conversion times and filtering.

The INA220 is a high or low side current shunt and power monitor with an I2C interface. The INA220 monitors both shunt drop and supply voltage.

The INA226 is a current shunt and power monitor with an I2C interface. The INA226 monitors both a shunt voltage drop and bus supply voltage.

INA230 and INA231 are high or low side current shunt and power monitors with an I2C interface. The chips monitor both a shunt voltage drop and bus supply voltage.

The shunt value in micro-ohms can be set via platform data or device tree at compile-time or via the `shunt_resistor` attribute in sysfs at run-time. Please refer to the Documentation/devicetree/bindings/hwmon/ti,ina2xx.yaml for bindings if the device tree is used.

Additionally ina226 supports `update_interval` attribute as described in Documentation/hwmon/sysfs-interface.rst. Internally the interval is the sum of bus and shunt voltage conversion times multiplied by the averaging rate. We don't touch the conversion times and only modify the number of averages. The lower limit of the `update_interval` is 2 ms, the upper limit is 2253 ms. The actual programmed interval may vary from the desired value.

## General sysfs entries

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in0_input	Shunt voltage(mV) channel
in1_input	Bus voltage(mV) channel
curr1_input	Current(mA) measurement channel
power1_input	Power(uW) measurement channel
shunt_resistor	Shunt resistance(uOhm) channel

## Sysfs entries for ina226, ina230 and ina231 only

in0_crit	Critical low shunt voltage
in0_crit	Critical high shunt voltage
in0_crit_alarm	Shunt voltage critical low alarm
in0_crit_alarm	Shunt voltage critical high alarm
in1_crit	Critical low bus voltage
in1_crit	Critical high bus voltage
in1_crit_alarm	Bus voltage critical low alarm
in1_crit_alarm	Bus voltage critical high alarm
power1_crit	Critical high power
power1_crit_alarm	Power critical high alarm
update_interval	data conversion time; affects number of samples used to average results for shunt and bus voltages.

### Note

- Configure *shunt\_resistor* before configure *power1\_crit*, because power value is calculated based on *shunt\_resistor* set.
- Because of the underlying register implementation, only one *\*crit* setting and its *alarm* can be active. Writing to one *\*crit* setting clears other *\*crit* settings and alarms. Writing 0 to any *\*crit* setting clears all *\*crit* settings and alarms.