power_control

Version: 1.0

Thursday 6th February, 2020 17:43

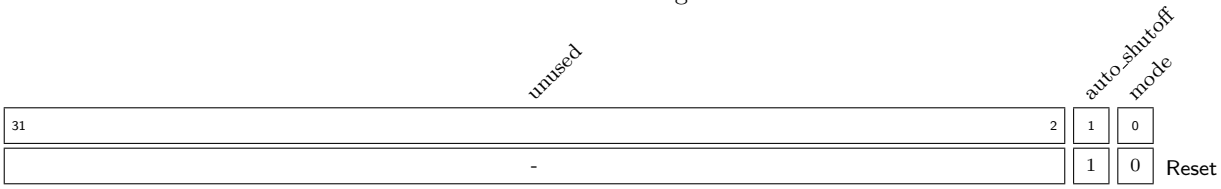
Control and monitor ALPIDE power. Interface several (up to 12, 2 for each stave) INA226 ICs via I2C.

1 Register List

#	Name	Mode	Address	Type	Length	Reset
0	config	RW	0x00000000	FIELDS	2	0x2
1	i2c_status	RO	0x00000001	FIELDS	8	0x0
2	i2c_write	RW	0x00000002	FIELDS	31	0x0
3	i2c_read	RO	0x00000003	FIELDS	16	0x0
4	i2c_command	PULSE	0x00000004	FIELDS	3	0x0
5	dvdd_enable	RW	0x00000005	SLV	6	0x0
6	avdd_enable	RW	0x00000006	SLV	6	0x0
7	avdd_current_limits	RW	0x00000007	FIELDS	32	0x0
8	dvdd_current_limits	RW	0x00000008	FIELDS	32	0x0
9	minimum_current	RW	0x00000009	FIELDS	32	0x0
10	current_stave0	RO	0x0000000A	FIELDS	32	0x0
11	current_stave1	RO	0x0000000B	FIELDS	32	0x0
12	current_stave2	RO	0x0000000C	FIELDS	32	0x0
13	current_stave3	RO	0x0000000D	FIELDS	32	0x0
14	current_stave4	RO	0x0000000E	FIELDS	32	0x0
15	current_stave5	RO	0x0000000F	FIELDS	32	0x0
16	stave_dvdd_status	RO	0x00000010	FIELDS	18	0x0
17	stave_avdd_status	RO	0x00000011	FIELDS	18	0x0
18	reset_stave_status	PULSE	0x00000012	SLV	6	0x0
19	bias_control	RW	0x00000013	SLV	2	0x0

2 Registers

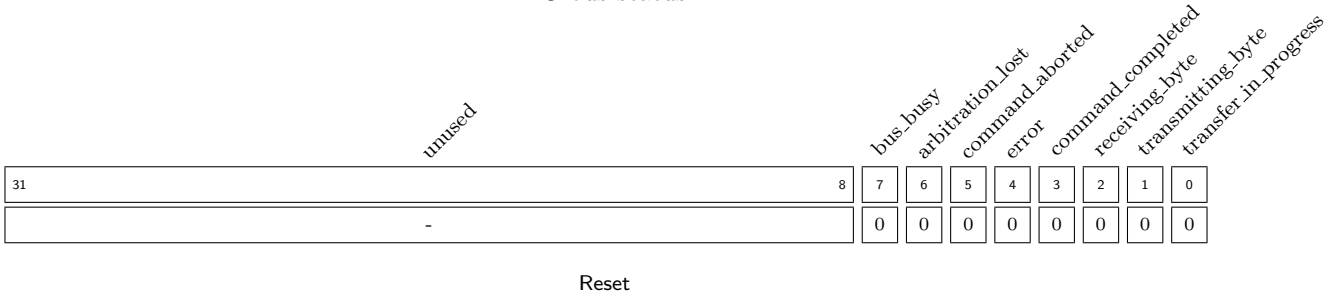
Register 2.1: CONFIG - RW (0x00000000)
Power Control configuration.



mode 0 \(\to\)˜ configuration mode. 1 \(\to\)˜ continuous monitoring mode. In configuration mode, the I2C bus is controlled by the AXI bus.

auto_shutoff If set, monitors the INA226 alert pin and disables power supply if alerts occur or current exceeds critical level as defined by register.

Register 2.2: I2C_STATUS - RO (0x00000001)
I2C bus status.



transfer_in_progress An I2C-transfers is in progress.

transmitting_byte An I2C byte transmit is in progress.

receiving_byte An I2C byte receiving is in progress.

command_completed Last I2C command was completed.

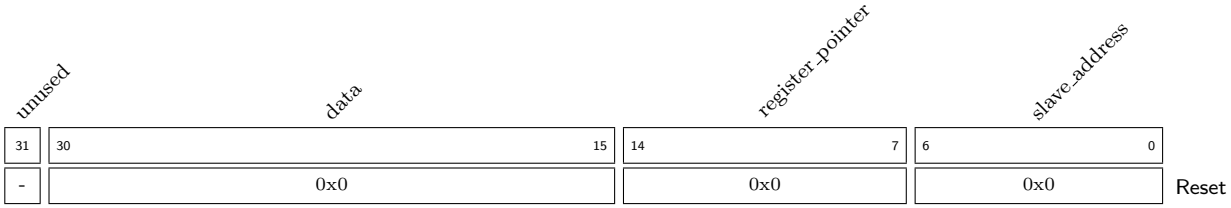
error Some kind of error occurred.

command_aborted I2C operation was aborted by user.

arbitration_lost I2C arbitration lost.

bus_busy I2C bus is busy.

Register 2.3: I2C_WRITE - RW (0x00000002)
I2C operation bytes.

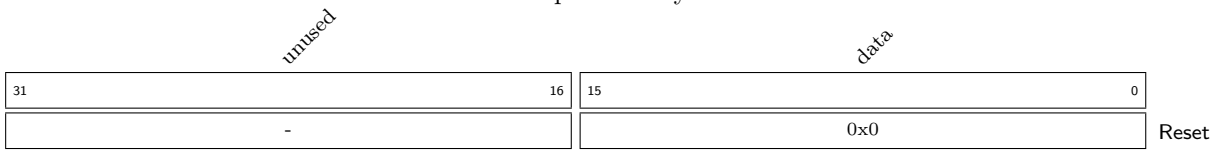


slave_address Slave-address byte.

register_pointer Register-pointer byte.

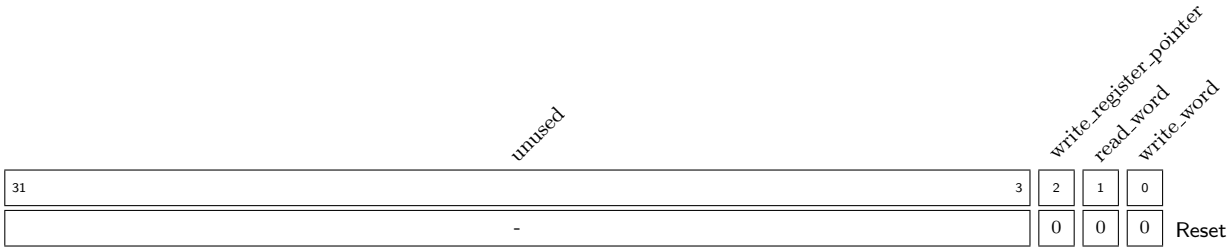
data Data to be written to device.

Register 2.4: I2C_READ - RO (0x00000003)
I2C operation bytes.



data Data read from device.

Register 2.5: I2C_COMMAND - PULSE FOR 1 CYCLES (0x00000004)
Control the I2C bus.

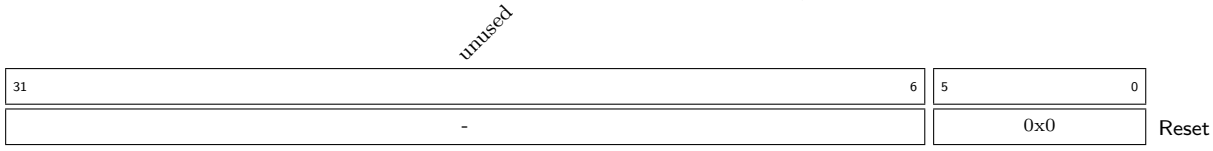


write_word Start I2C write procedure. Including register pointer and 2 bytes of data.

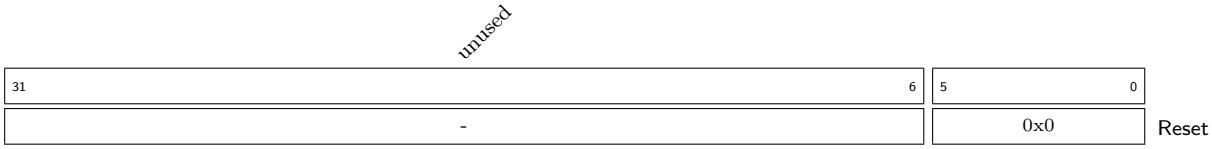
read_word Start I2C read procedure. Does not include writing of register pointer.

write_register_pointer Start I2C write register pointer procedure. Required to read a different register than what is already stored on the INA chips.

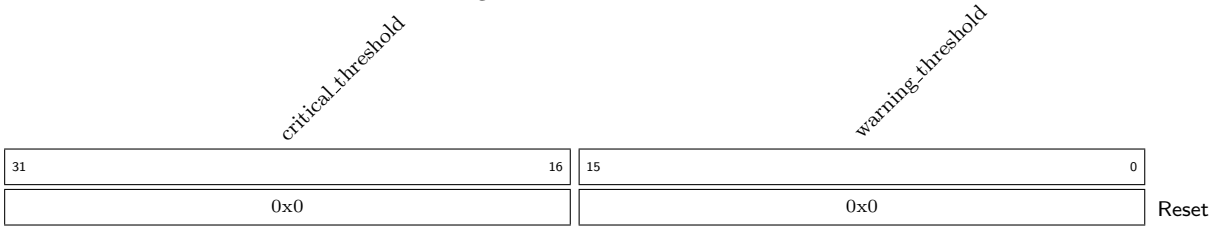
Register 2.6: DVDD_ENABLE - RW (0x00000005)
Turn on 1.8V DVDD. Bit 0 = stave 0, etc.



Register 2.7: AVDD_ENABLE - RW (0x00000006)
Turn on 1.8V AVDD. Bit 0 = stave 0, etc.



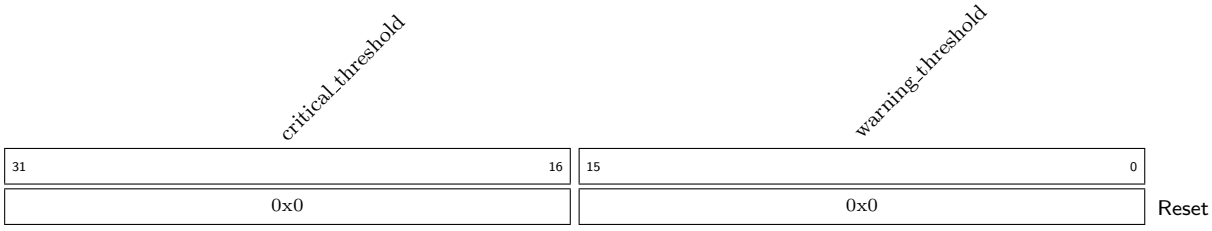
Register 2.8: AVDD_CURRENT_LIMITS - RW (0x00000007)
The current limits for the ALPIDE AVDD per stave. The resolution is set by settings on the INA226 chips. Is ignored if the value is 0x0.



warning_threshold Current above this threshold triggers a warning.

critical_threshold Current above this threshold disables power regulator and triggers critical level.

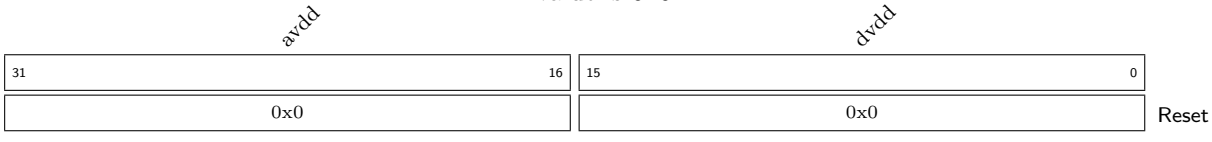
Register 2.9: DVDD_CURRENT_LIMITS - RW (0x00000008)
The current limits for the ALPIDE AVDD per stave. The resolution is set by settings on the INA226 chips. Is ignored if the value is 0x0.



warning_threshold Current above this threshold triggers a warning.

critical_threshold Current above this threshold disables power regulator and triggers critical level.

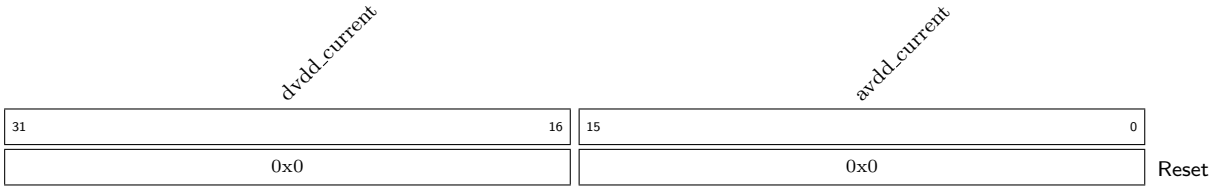
Register 2.10: MINIMUM_CURRENT - RW (0x00000009)
The minimum current of a stave. The resolution is set by settings on the INA226 chips. Is ignored if the value is 0x0.



dvdd Current below this threshold triggers a warning.

avdd Current below this threshold triggers a warning.

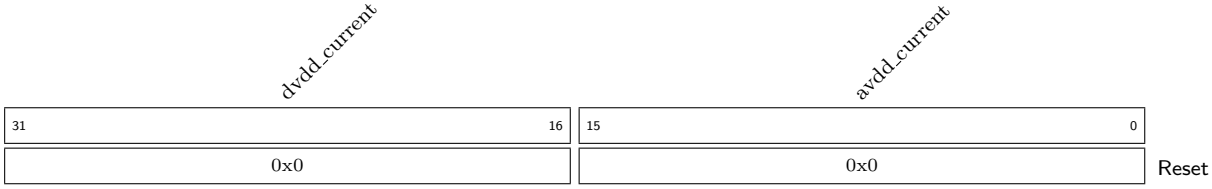
Register 2.11: CURRENT_STAVE0 - RO (0x0000000A)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

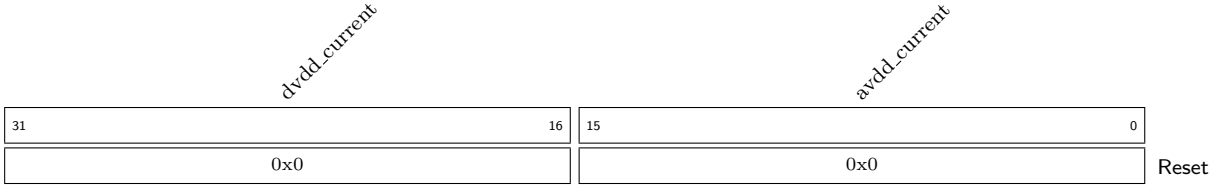
Register 2.12: CURRENT_STAVE1 - RO (0x0000000B)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

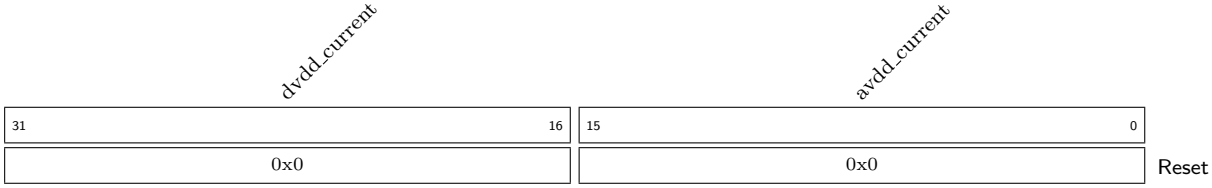
Register 2.13: CURRENT_STAVE2 - RO (0x0000000C)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

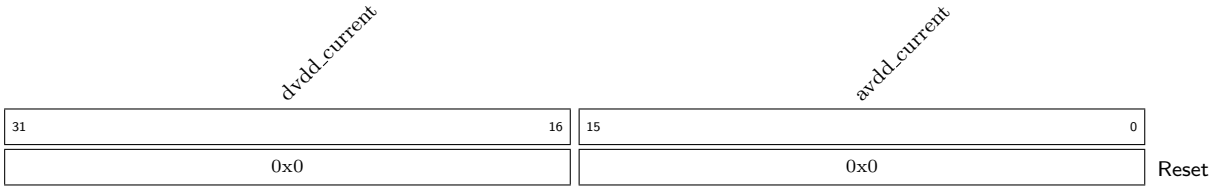
Register 2.14: CURRENT_STAVE3 - RO (0x0000000D)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

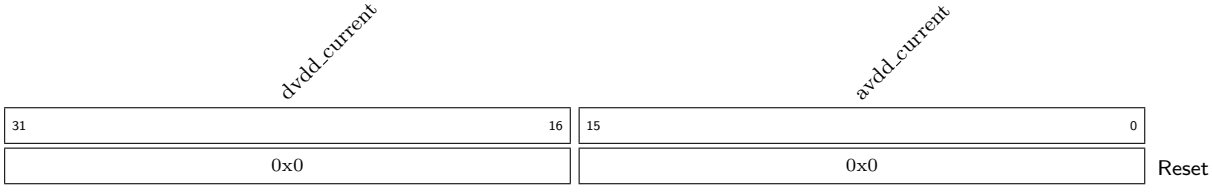
Register 2.15: CURRENT_STAVE4 - RO (0x0000000E)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

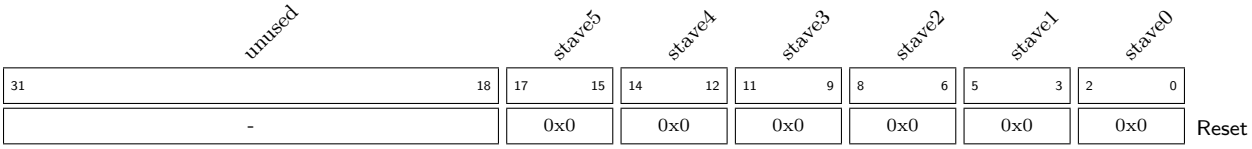
Register 2.16: CURRENT_STAVE5 - RO (0x0000000F)
Supply current measured by INA226. Updated only in monitoring mode.



avdd_current Analog supply current.

dvdd_current Digital supply current.

Register 2.17: STAVE_DVDD_STATUS - RO (0x00000010)
Status of DVDD supply for each stave. 0 \(\to\)˜ OFF, 1 \(\to\)˜ OK, 2 \(\to\)˜ WARNING, 3 \(\to\)˜ CRITICAL, 4 \(\to\)˜ ALERT.



stave0 Stave0 DVDD status.

stave1 Stave1 DVDD status.

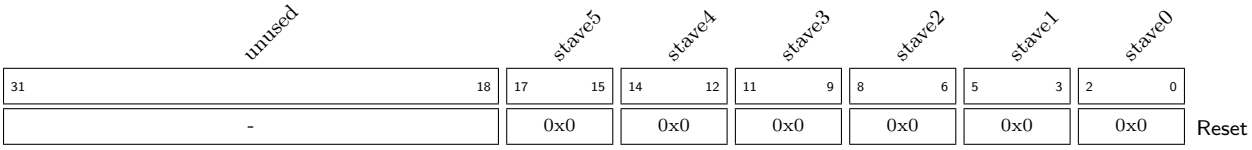
stave2 Stave2 DVDD status.

stave3 Stave3 DVDD status.

stave4 Stave4 DVDD status.

stave5 Stave5 DVDD status.

Register 2.18: STAVE_AVDD_STATUS - RO (0x00000011)
Status of AVDD supply for each stave. 0 \(\to\)˜ OFF, 1 \(\to\)˜ OK, 2 \(\to\)˜ WARNING, 3 \(\to\)˜ CRITICAL, 4 \(\to\)˜ ALERT.



stave0 Stave0 AVDD status.

stave1 Stave1 AVDD status.

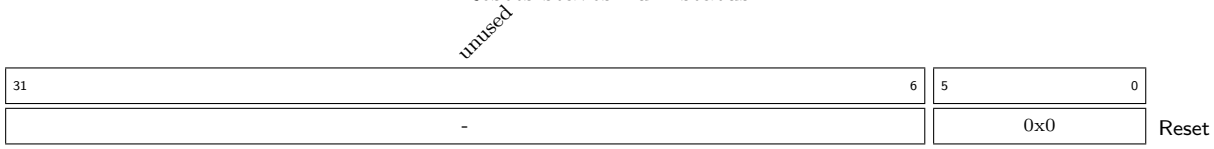
stave2 Stave2 AVDD status.

stave3 Stave3 AVDD status.

stave4 Stave4 AVDD status.

stave5 Stave5 AVDD status.

Register 2.19: RESET_STAVE_STATUS - PULSE FOR 1 CYCLES (0x00000012)
Resets staves num status.



Register 2.20: BIAS_CONTROL - RW (0x00000013)
Set the BIAS VOLTAGE for all staves. 00 \(\to\)˜ 0V, 01 \(\to\)˜ -2V1, 10 \(\to\)˜ -3V, 11 \(\to\)˜ -6V