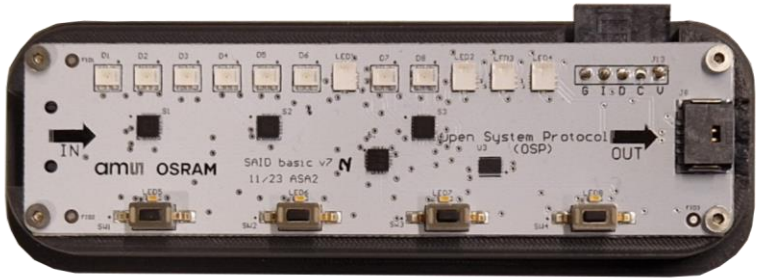
SAIDbasic manual

https://github.com/ams-OSRAM/OSP_aotop/tree/main/examples/saidbasic



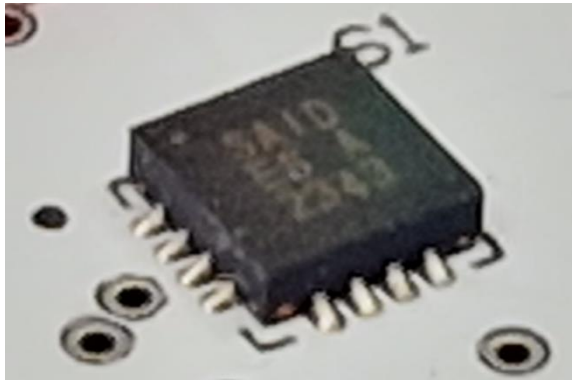
SAID, RGBi and OSP ecosystem

Open System Protocol (OSP)

- A protocol, introduced by ams OSRAM, for (automotive indoor) decorative lighting (initially for “OSIRE”)
- OSP is an open “standard” and full documentation is available for market players and competitors to implement own devices
- ams OSRAM is actively working with partners to build an ecosystem of components around OSP
- An OSP system consists of a root MCU with OSP firmware and a daisy chain of up to 1000 OSP compliant nodes
- Two node types exist from ams OSRAM: RGBi and SAID

RGBi (or “RGB intelligent ”)

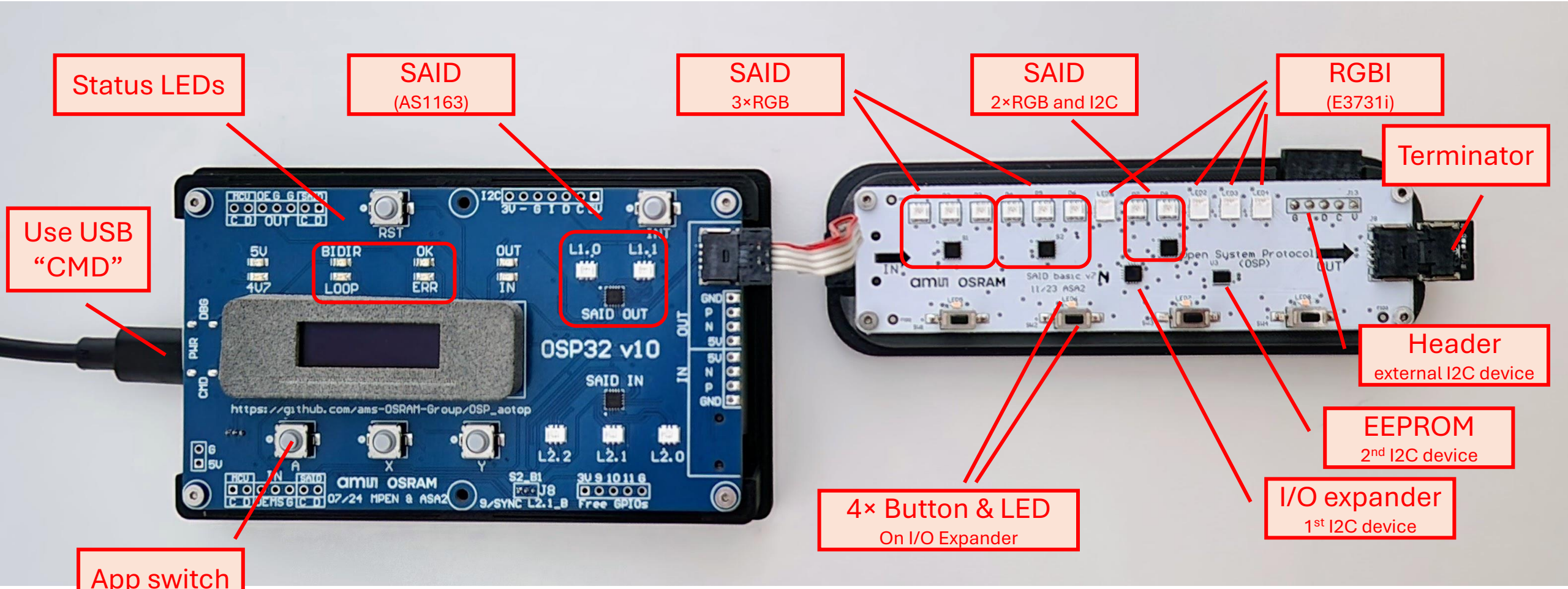
- First type of node (available 2023), the E3731i nicknamed RGBi
- Contains three (PWM) drivers and three integrated LEDs (red, green, blue)
- “intelligent” (=OSP compliant, can send an receive OSP telegrams)
- color/temperature calibrated



SAID (or “stand-alone intelligent driver”)

- A second type of node (available 2024), the AS1163 nicknamed SAID
- Has 9 PWM drivers: 3 channels to drive 3 external RGB modules (or 9 stand-alone LEDs)
- One channel can be configured to act as I2C master allowing I2C devices in the OSP chain
  for example, I2C sensors, or I2C EEPROMs with calibration parameters
- It has 2-wire SPI (towards MCU) and group cast

Hardware setup



Software (generic)

The **SAIDbasic** firmware contains these apps:

- Animation script
- Running LEDs
- Switch flag
- Dithering

- A demo software stack typically contains multiple apps and serial link
- Switch between them by pressing “A” button (app starts fresh)
- The OLED shows the app name and what the function of X and Y is (in that app)

- Autodetect of BiDir/Loop mode (on each app start) – see status LEDs
- Apps auto-detect RGB triplets and I2C bridges – they adapt their animation to that

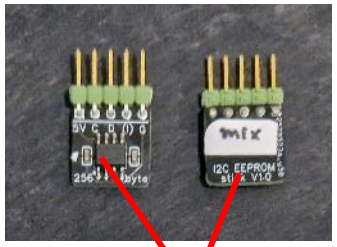
- While an app runs, the green “OK” led blinks
- When there is an error, green stops, red “ERR” switches on, OLED shows message

- LEDs are driven in “night” mode (OSIRE 10mA, SAID 12mA).

Animation script

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
with prev	start of region			end of region			red brightness			green brightness			blue brightness		

Script instructions only have 3 bits for each color, and 3 for a region, so script animations are coarse.

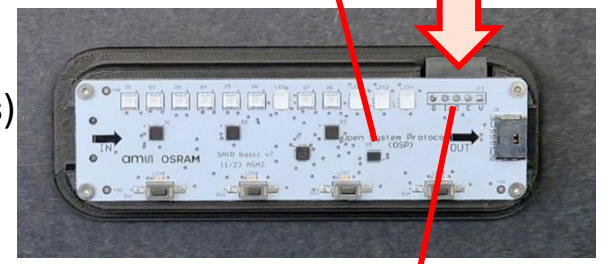


External EEPROM
with animation scripts

Description

- Plays a light show as defined by an animation script
- Tries to find a SAID with an I2C bridge with an EEPROM
- If there is an external EEPROM stick (I2C address 0x51) it favors that over an internal EEPROM (address 0x50)
- If there are multiple (of the same kind, external or internal) the first one is taken
- If no EEPROM is found, uses the heartbeat script included in the firmware
- If an EEPROM is found, loads the script from the EEPROM and plays that
- The internal EEPROM (on the SAIDbasic board) contains the rainbow script
- External EEPROMs are flashed with bouncing-block and color-mix

Internal EEPROM
with animation scripts



Connector
for external EEPROMs

Notes

- Ensure the I2C EEPROM stick faces "chip up" otherwise there is a short circuit (see PCB labels)
- Safest is to only swap an EEPROM when USB power is removed
- The script loading takes place on app start: (1) power cycle, (2) reset, (3) “A” button.

Buttons

- The X and Y buttons control the FPS level (frames-per-second animation speed).

Goal

- Show that the root MCU can access I2C devices (EEPROM) e.g. for calibration values

To flash an animation script see
https://github.com/ams-OSRAM/OSP_aotop/tree/main/examples/eepromflasher

Running LEDs

Description

- There is a "virtual cursor" that runs from the begin of the chain to the end and then back
- Chain length and node types are auto detected
- Every 25ms the cursor advances one LED and paints that in the current color
- Every time the cursor hits the begin or end of the chain, it steps color
- Color palette: red, yellow, green, cyan, magenta

Buttons

- The X and Y buttons control the dim level (RGB brightness)

Goal

- To show that various OSP nodes can be mixed and have color/brightness matched

In this demo, there is no algorithm running using LED color calibration data to stabilize colors over LEDs and over temperature

Switch flag

Description

- Shows one (static) flag at a time, eg red/white/blue spread over the OSP chain
- Tries to find a SAID with an I2C bridge with an I/O-expander (with four buttons and four indicator LEDs)
- If there is no I/O-expander, shows four static flags switching on a time basis
- If there are multiple I/O-expanders the first one is taken
- When an I/O-expander is found the four buttons select which flag to show
- The indicator LEDs indicate which button/flag was selected

Buttons

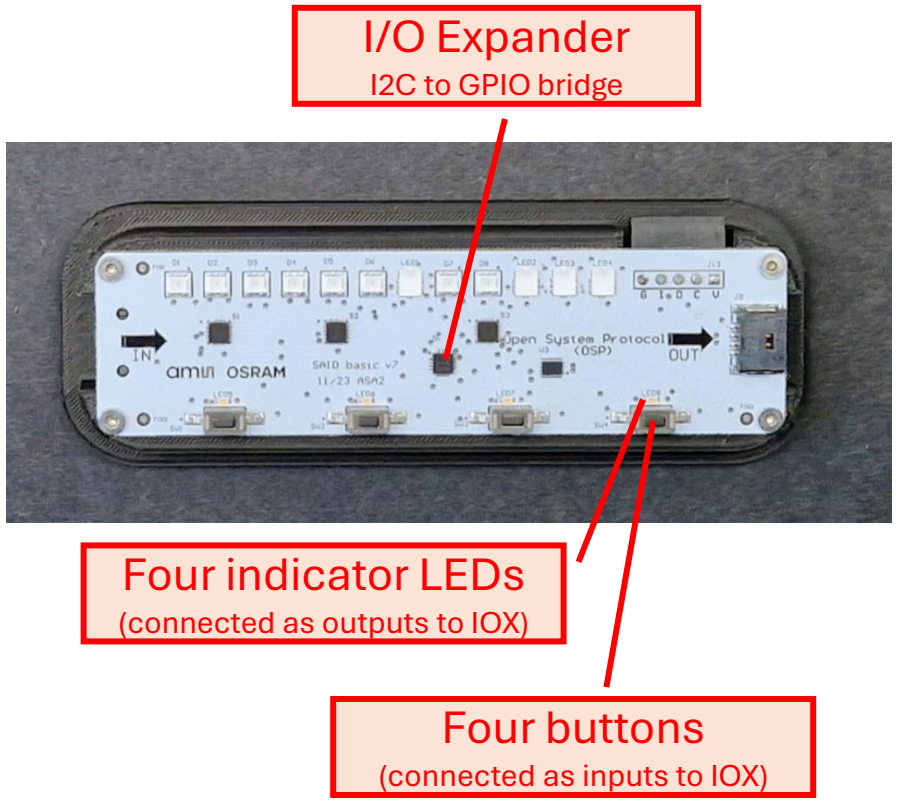
- The X and Y buttons control the dim level (RGB brightness)

Notes

- When the app quits, the indicator LED switches off
- This app adds a command to configure which four flags will be shown

Goal

- To show a "sensor" (button) being accessible from the root MCU (the ESP)



Dithering

Description

- The LEDs are in a dimming cycle (dim up, then dim down, then up again, etc).
- All LEDs dim synchronously and at the same level (so RGBs look white).
- Dithering can be enabled/disabled

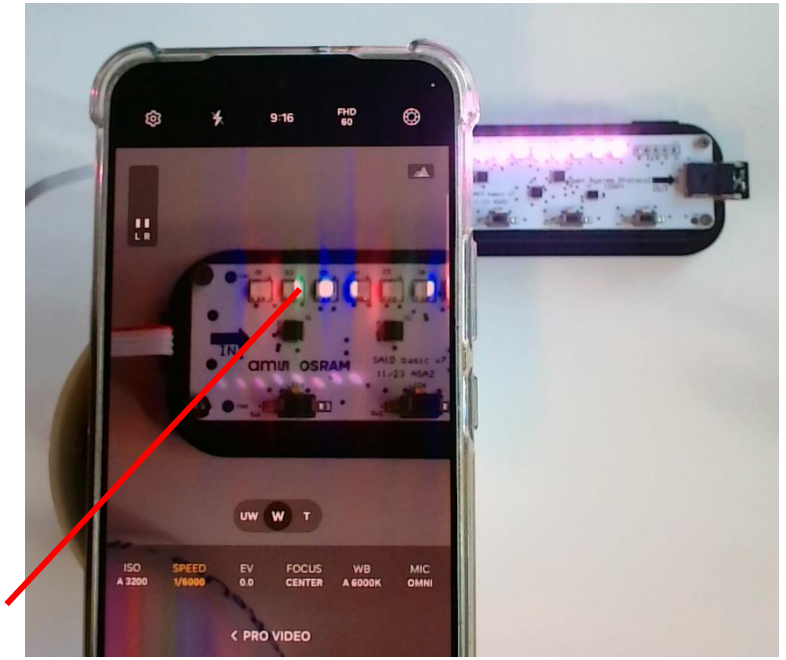
Buttons

- The X button toggles dim cycling on/off.
- The Y button toggles dithering on/off.

Goal

- To show the effect of dithering
- View the LEDs with e.g. LED Light Flicker Meter
  https://play.google.com/store/apps/details?id=com.contechity.flicker_meter
- Alternatively, view the LEDs with a mobile phone camera
  “pro mode” video with high framerate

Dithering disabled
flicker



Dithering enabled
no flicker