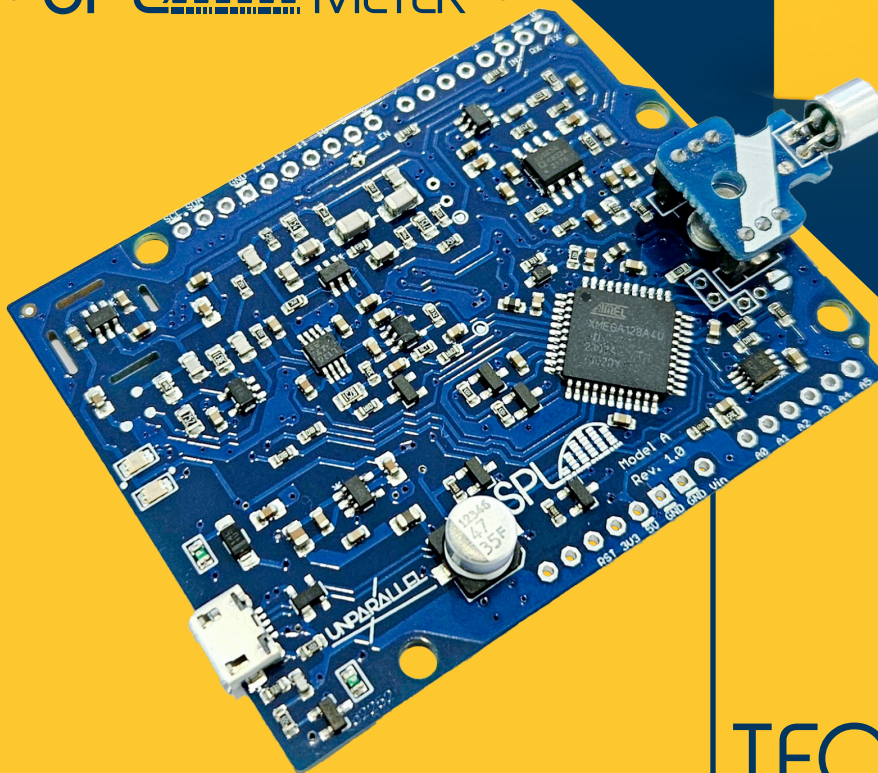


UNPARALLEL

SPL  METER



TECHNICAL DOCUMENTATION

spl.unparallel.pt

01

DATASHEET

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02

ASCII COMMANDS

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03

BYTE COMMANDS

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04

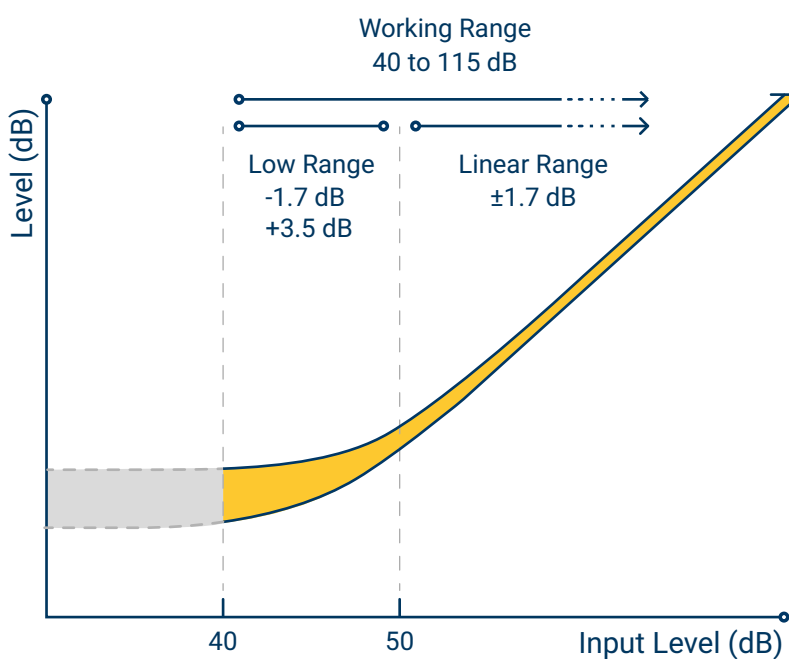
APPENDIX

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OVERVIEW

CHARACTERISTICS

| | |
|--------------------------|-----------------------------------|
| SPL Working Range | 40 to 115 dB |
| Frequency Weighting | IEC 61672-1 A and C Filter |
| Time Weighting | IEC 61672-1 Slow (S) and Fast (F) |
| Communication | UART I ² C USB |
| Power Consumption | 40 mA Active |
| Supply Voltage (nominal) | 5 V |
| Supply Voltage (range) | 3.6 to 6 V |
| Certification | ROHS2 / CE (Pending) |



ADDITIONAL FEATURES

- Continuous Noise Monitor
- Threshold Detection
- Statistical Noise Level

ACOUSTIC MODES

Each measurement has inherent the sound pressure Level with the A-weighting or C-weighting filter in dB, depending on the selected frequency-weighting

LAS
LCS

represents the Slow measurement of time weighting. Has an associated time constant of 1 second.

LASmin
LCSmin

minimum value of the Slow measurement in the currently time window

LASmax
LCSmax

maximum value of the Slow measurement in the currently time window

LAF
LCF

represents the Fast measurement of time weighting. Has an associated time constant of 0.125 second.

LAFmin
LCFmin

minimum value of the Fast measurement in the currently time window

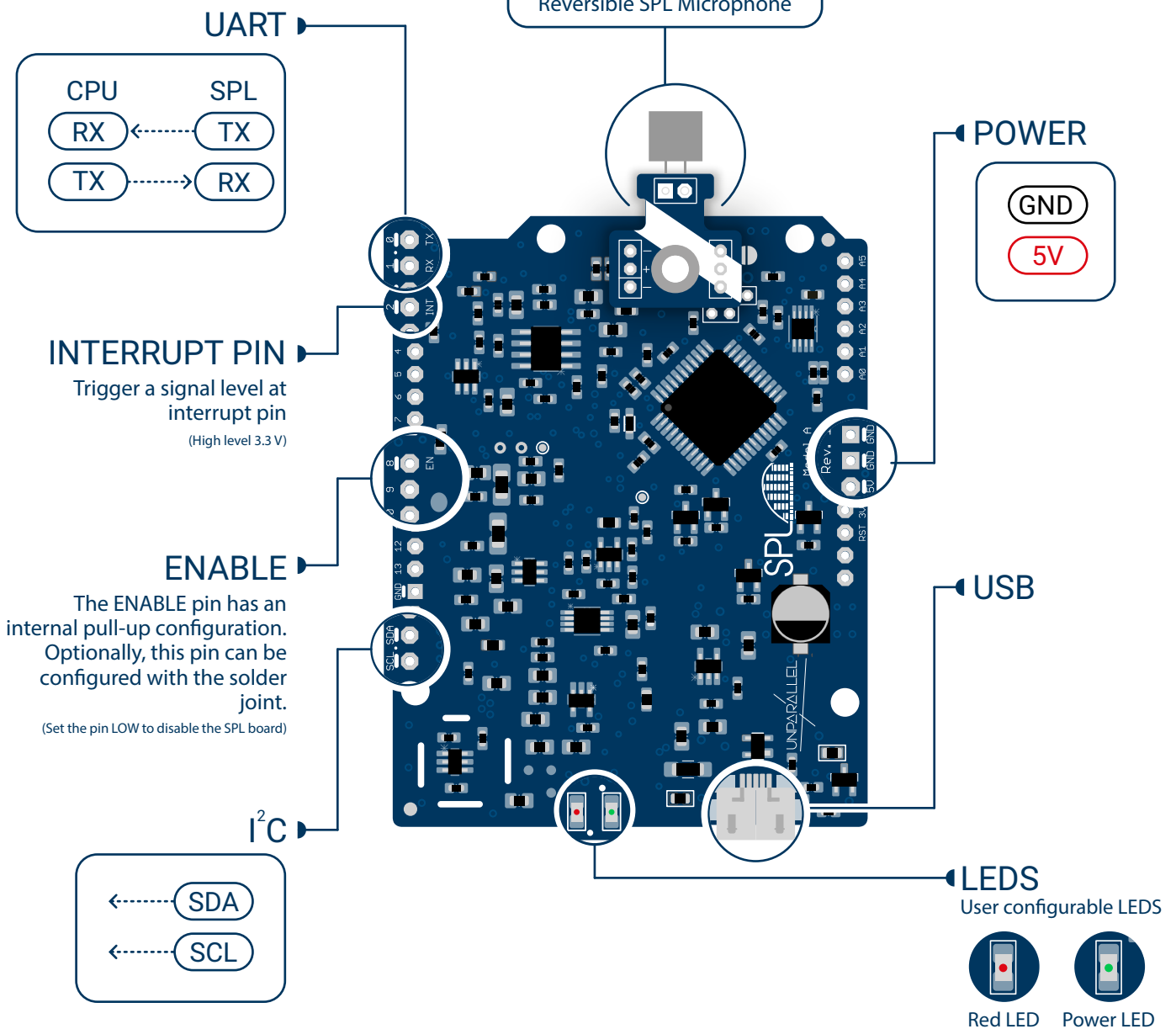
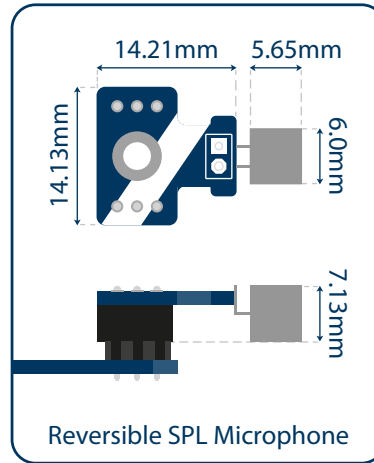
LAFmax
LCFmax

maximum value of the Fast measurement in the currently time window

LAeq
LCEq

Equivalent continuous is the average of sound pressure level (acoustic energy over the time window)

PINOUT



COMMUNICATION OVERVIEW

USB

- Creates a virtual communication port (CDC)
- Tested with USB 2.0, USB 3.0, USB 3.1

OS requirements

Windows 7
Drivers required (link)

macOS
Drivers not required

Windows 10
Drivers not required

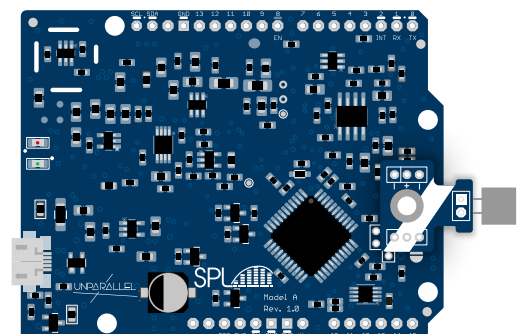
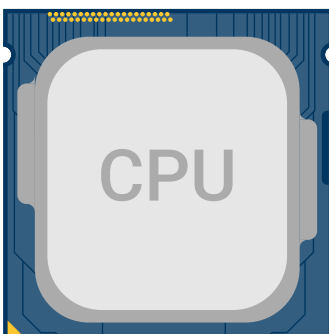
Linux Debian based (e.g. Ubuntu)
Drivers not required

I²C

- SPL works as slave device
- I²C master clock @ 100 kHz
- Default Address: 85 (decimal)
- Supports 3.3 V and 5 V logic levels
- Pull-up resistors are recommended
- I²C commands must not exceed 32 bytes else split in several messages

UART

- Baud rate: 9600
- Supports 3.3 V and 5 V logic levels
- Uses default serial configurations*



* Serial configuration: 8 data bits, 1 start bit, 1 stop bit and no parity

02 ASCII COMMANDS



OVERVIEW

FUNCTIONAL COMMANDS

SPL:GET <argument>

Return the measured value in decibel (dB) for the requested mode, get time window passed or reset the time window

SPL:WINDOW:GET <argument>

Return the measured value in decibel (dB) for the requested last minute(s) defined

SPL:WINDOW:SIZE <argument>

Set the size of the time window

SPL:FILTER <A | C>

Set the frequency weighting filter A or C

SPL:THOLD <argument>

Detect when the level in a specific mode crosses the specified Threshold level and trigger an event

SYSTEM COMMANDS

SPL:SYS:INFO <argument>

SPL:SYS:I2C:ADDR <address>

SPL:SYS:RLED <argument>

SPL:SYS:PLED <argument>

SPL:SYS:CAL <level>

SPL:SYS:FACTORYRESTORE

SPL:SYS:REPLYWITHCMD <ON | OFF>

SPL:SYS:ERRORS:VERBOSE <ON | OFF>

SPL:HELP

STRUCTURE

ASCII COMMAND

+

TERMINATOR CHAR

The commands are encoded in ASCII data format and must be terminated with carriage return, line feed character, or both.

In case of wrong syntax in the command, the SPL returns the error message

COMMAND

NON CASE-SENSITIVE ASCII

TERMINATOR

<CR> OR <LF> OR <CR><LF>

COMMAND DETAILS

GET

WINDOW

FILTER

THRESHOLD

SYSTEM

HELP

SPL:GET <argument>

Get the current acoustic measured value in decibel (dB) for instantaneous and continuous dependent modes

| REQUEST | RESPONSE |
|----------------|----------|
| SPL:GET <mode> | <LEVEL> |
| SPL:GET STATUS | <TIME> |
| SPL:GET RESET | OK |

Description

Returns the measured sound level in decibel (dB) of the queried instantaneous modes (fast or slow time weightings as defined in the IEC 61672-1 standard), or continuous modes (Equivalent Continuous or maximum and minimum for fast or slow time weightings). The continuous modes are always running and reset automatically after 24 hours have passed since the last reset. A manual reset can be done with the reset command. The measurements can be A or C frequency-weighting filter (IEC 61672-1 standard). The factory default is the A-weighting filter and can be switched with the SPL:FILTER command. See page 13 for more details.

Note: When the filter is changed the sound measurements and the timer counter are reset.

<mode> L<A | C>F | L<A | C>S | L<A | C>eq | L<A | C>max | L<A | C>min
Go to the page 4 to have more information about the available modes

STATUS Get the run-time for continuous modes

RESET Resets the continuous measurements and the associated timer counter (STATUS command)

| REQUEST | RESPONSE | EXAMPLE |
|------------------------|--------------|---------|
| SPL:GET LAS<cr> | 55.8<cr><lf> | |
| SPL:GET LCF<lf> | 65.1<cr><lf> | |
| SPL:GET LASmin<cr><lf> | 45.4<cr><lf> | |
| SPL:GET LCEq<cr><lf> | 68.3<cr><lf> | |
| SPL:GET LAFmax<cr><lf> | 93.3<cr><lf> | |
| SPL:GET STATUS<cr><lf> | 1046<cr><lf> | |
| SPL:GET RESET<cr><lf> | OK<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD SYSTEM HELP

SPL:WINDOW:GET <argument>

Get the current acoustic measured value in dB based on the WINDOW SIZE defined

| REQUEST | RESPONSE |
|-------------------------------------|----------|
| SPL:WINDOW:GET L<A C>eq | <LEVEL> |
| SPL:WINDOW:SIZE L<A C><max min> | <LEVEL> |
| SPL:WINDOW:SIZE L<A C><n> | <LEVEL> |

Description

Return the acoustic measurement over a period of measurement, which is set via SPL:WINDOW:SIZE command. It provides the average level of the window size and also statistics noise levels. The statistic noise describes the level that exceeded, percentile related, over the window size. E.g LA50 indicate the level that was exceed 50% of time.

Notes:

- The statistics noise measurement is based on L<A | C>eq
- The L<A | C>max and L<A | C>min are approximations of the L<A | C><n> extremes

| | |
|-------------|---|
| L<A C>eq | Get the Equivalent continuous of the last minute(s) defined in the WINDOW SIZE command. |
| L<A C>max | Get the maximum value measured in the last Minute(s) defined in the WINDOW SIZE command |
| L<A C>min | Get the minimum value measured in the last Minute(s) defined in the WINDOW SIZE command |
| L<A C><n> | Get the percentile value of <n> (n from 1 to 99) in the last Minute(s) defined in the WINDOW SIZE command |

| REQUEST | RESPONSE | EXAMPLE |
|------------------------------|---------------|---------|
| SPL:WINDOW:GET LAeq<lf> | 78.5<cr><lf> | |
| SPL:WINDOW:GET LCmax<cr><lf> | 108.7<cr><lf> | |
| SPL:WINDOW:GET LAmin<cr><lf> | 48.5<cr><lf> | |
| SPL:WINDOW:GET LC10<cr><lf> | 102.4<cr><lf> | |
| SPL:WINDOW:GET LA50<cr><lf> | 80.5<cr><lf> | |
| SPL:WINDOW:GET LA90<cr><lf> | 52.3<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD SYSTEM HELP

SPL:WINDOW:SIZE <argument>

Set or query the size of the time window in minutes

REQUEST

SPL:WINDOW:SIZE <value>

SPL:WINDOW:SIZE ?

RESPONSE

OK

<current window size>

Description

This command sets the size of the window in minutes (1 - 15).

Notes:

- For the window size of 1 minute, the internal sampling is 8 samples per second or 125 ms sampling time (higher resolution)
- With a window size between 2 to 15 minutes, the internal sampling is 1 sample per second (less resolution)
- When the window size is set, all the previous statistical values are cleared and the measurements are restarted
- The default value is 15 minutes of window size

<value> This parameter is to define the size of the window

? Queries the size of the time window defined in the SPL device

REQUEST

SPL:WINDOW:SIZE 10<cr>

SPL:WINDOW:SIZE ?<lf>

RESPONSE

OK<cr><lf>

10<cr><lf>

EXAMPLE

COMMAND DETAILS

GET WINDOW **FILTER** THRESHOLD SYSTEM HELP

SPL:FILTER <A | C>

Select or query the frequency-weighting filter (A or C)

| REQUEST | RESPONSE |
|--------------|----------------------------|
| SPL:FILTER A | OK |
| SPL:FILTER C | OK |
| SPL:FILTER ? | <current weighting filter> |

Description

Sets the frequency-weighting filter (A or C) and provides information about the current weighting filter.

Note: Changing the weighting filter will result in:

- the losses of all the continuous measurements (Equivalent Continuous, Maximum and Minimum value)
- reset of the elapsed time register (SPL:GET STATUS)
- after power down, the filter will be set to the last one selected, or A-weighting after a factory reset command (see command SPL:SYS:FACTORYRESTORE on page 20)

| | |
|---|---|
| A | Set the A-weighting filter |
| C | Set the C-weighting filter |
| ? | Options of frequency-weighting filter (A or C filter) |

| REQUEST | RESPONSE | EXAMPLE |
|----------------------|------------|---------|
| SPL:FILTER ?<cr> | A<cr><lf> | |
| SPL:FILTER C<cr><lf> | OK<cr><lf> | |
| SPL:FILTER ?<cr><lf> | C<cr><lf> | |

COMMAND DETAILS



NOT AVAILABLE IN

I²C

GET

WINDOW

FILTER

THRESHOLD

SYSTEM

HELP

SPL:THOLD <argument(s)>

This command tells you when the sound level crosses the set level with the associated mode

| REQUEST | RESPONSE |
|--------------------------------------|---|
| SPL:THOLD ON <mode> <level> | OK |
| SPL:THOLD OFF | OK |
| SPL:THOLD ? | ON <mode> <level> OFF |
| Generated Message on event detection | SPL:THOLD:DETECT <mode> <level> <H L> |

Description

Controls the detector of measurements crossing a defined threshold in the selected mode. The acoustical modes enabled are the instantaneous and the continuous. It generates a detection message every time that the measurement crosses over the defined threshold (from lower to higher or from higher to lower). The message informs if the reading was higher than the threshold (H) or lower than the threshold (L) and also displays the configured mode and threshold level.

Note: If enable is performed when there is already an active Threshold then the previous one is overridden

| | |
|-------------------|---|
| ON <mode> <level> | Start threshold monitoring for the desired mode and level (range: 30 - 130) |
| OFF | Stop threshold monitoring |
| ? | Queries the state of the threshold |

| REQUEST | RESPONSE | EXAMPLE |
|---------------------------|--|---------|
| SPL:THOLD ON LAS 80.0<cr> | OK<cr><lf> SPL:THOLD:DETECT LAS 80.0 H <cr><lf> | |
| SPL:THOLD OFF<cr><lf> | OK<cr><lf> | |
| SPL:THOLD ?<cr><lf> | ON LAS 80.0 <cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:INFO <argument>

Show system information

| REQUEST | RESPONSE |
|------------------------|----------|
| SPL:SYS:INFO UPTIME | <STRING> |
| SPL:SYS:INFO VERSION | <STRING> |
| SPL:SYS:INFO SERIALNUM | <STRING> |
| SPL:SYS:INFO HWVERSION | <STRING> |

| | | Description |
|------------------------------|---------------------------|-------------|
| Print SPL system information | | |
| UPTIME | Returns the uptime of SPL | |
| SERIALNUM | Serial number | |
| VERSION | Firmware version | |
| HWVERSION | Hardware version | |

| REQUEST | RESPONSE | EXAMPLE |
|--------------------------------|-------------------------------|---------|
| SPL:SYS:INFO UPTIME<cr> | 3 Days 5h 43m and 15s<cr><lf> | |
| SPL:SYS:INFO SERIALNUM<lf> | e1a57bf3bd4a<cr><lf> | |
| SPL:SYS:INFO VERSION<cr><lf> | 1.2.0<cr><lf> | |
| SPL:SYS:INFO HWVERSION<cr><lf> | A Rev. 1.0<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:I2C:ADDR <address>

Set or query the I²C address

| REQUEST | RESPONSE | |
|--|--|-------------|
| SPL:SYS:I2C:ADDR <address> | <STRING> | |
| SPL:SYS:I2C:ADDR ? | <current I ² C address> | |
| Define the I ² C address for the device. The default I ² C address is 85 (decimal) | | Description |
| <address> | Set I ² C address: 7-bit address in decimal format (range: 1 - 127) | |
| ? | Query I ² C address | |
| REQUEST | RESPONSE | EXAMPLE |
| SPL:SYS:I2C:ADDR ?<cr><lf> | 85<cr><lf> | |
| SPL:SYS:I2C:ADDR 25<lf> | OK<cr><lf> | |
| SPL:SYS:I2C:ADDR ?<cr><lf> | 25<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:RLED <ON | OFF | THOLD>

Set the state of the Red LED

| REQUEST | RESPONSE |
|--------------------|----------|
| SPL:SYS:RLED ON | OK |
| SPL:SYS:RLED OFF | OK |
| SPL:SYS:RLED THOLD | OK |

Description

Control the state of red LED. It has three states: ON, OFF or controlled by the Threshold command (i.e. turns on the LED when the level is higher than the specified threshold).
Note: By default Red LED is OFF

| REQUEST | RESPONSE | EXAMPLE |
|----------------------------|------------|---------|
| SPL:SYS:RLED ON<cr> | OK<cr><lf> | |
| SPL:SYS:RLED OFF<lf> | OK<cr><lf> | |
| SPL:SYS:RLED THOLD<cr><lf> | OK<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:PLED <ON | OFF | BLINK>

Select the state of the Power LED

| REQUEST | RESPONSE |
|--------------------|----------|
| SPL:SYS:PLED ON | OK |
| SPL:SYS:PLED OFF | OK |
| SPL:SYS:PLED BLINK | OK |

Description

Control the state of the Power LED (green light). It has three states: ON, OFF or Blink. The Blink state, defined by default, repeatedly turn ON the LED during 0.5 s and then OFF 0.5 s.

| REQUEST | RESPONSE | EXAMPLE |
|----------------------------|------------|---------|
| SPL:SYS:PLED ON<cr> | OK<cr><lf> | |
| SPL:SYS:PLED OFF<lf> | OK<cr><lf> | |
| SPL:SYS:PLED BLINK<cr><lf> | OK<cr><lf> | |

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:CAL <level>

Factory calibration of the microphone sensitivity with the provided level in dB (1 kHz Sine wave). Recommended 94 dB

| REQUEST | RESPONSE |
|---------|----------|
|---------|----------|

| | |
|-------------------------|----|
| SPL:SYS:CAL Value in dB | OK |
|-------------------------|----|

Description

To proceed with the tuning performance of the microphone sensitivity (offset), the reference sound source should be a sine wave with frequency of 1 kHz and the amplitude in a stable level of the SPL linear range (between 50 dB and 115 dB). After turning ON the sound generator ensure that it has stabilised and then send the calibration command.

Note: Be careful before making the factory calibration, exist many factors that has impact on the microphone sensitivity like:

- Temperature
- Humidity
- Mechanical issues (dust, damage)
- Barometric pressure

| REQUEST | RESPONSE | EXAMPLE |
|---------|----------|---------|
|---------|----------|---------|

| | | |
|------------------------|------------|--|
| SPL:SYS:CAL 94<cr><lf> | OK<cr><lf> | |
|------------------------|------------|--|

| | | |
|------------------------|----------------|--|
| SPL:SYS:CAL 94<cr><lf> | ERR 20<cr><lf> | |
|------------------------|----------------|--|

| | | |
|-------------------------|----------------|--|
| SPL:SYS:CAL 120<cr><lf> | ERR 04<cr><lf> | |
|-------------------------|----------------|--|



WARNING!!

If the calibration is not done correctly it can jeopardize the performance of SPL device!

If you get wrong measurements after doing a calibration please do a factory restore to reset the user calibrations with factory defaults (see SPL:SYS:FACTORYRESTORE command description for more details).

COMMAND DETAILS

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:FACTORYRESTORE

Restore Factory Settings and Calibrations

REQUEST

RESPONSE

SPL:SYS:FACTORYRESTORE NONE

OK

Description

Restores the factory default settings and calibrations to the SPL. During the progress both LED are turn ON.
Affected Parameters:

- Sets the calibration level (if any) to factory default
- Sets the I²C address to default (85 decimal)
- Turns OFF the threshold (if it is on)
- Sets the frequency-weighting filter to default (A-weighting)
- Sets the Power LED (PLED) to Blink state
- Sets the Red LED (RLED) to OFF state

REQUEST

RESPONSE

EXAMPLE

SPL:SYS:FACTORYRESTORE<cr><lf>

OK<cr><lf>

COMMAND DETAILS



NOT AVAILABLE IN

I²C

GET

WINDOW

FILTER

THRESHOLD

SYSTEM

HELP

SPL:SYS:REPLYWITHCMD <ON | OFF>

Turns ON or OFF the replies with the command before the response

REQUEST

RESPONSE

SPL:SYS:REPLYWITHCMD ON

OK

SPL:SYS:REPLYWITHCMD OFF

OK

Description

When is set to ON the received command is returned before the response

REQUEST

RESPONSE

EXAMPLE

SPL:SYS:REPLYWITHCMD ON<cr>

OK<cr><lf>

SPL:GET LAS<lf>

SPL:GET LAS 70.0<cr><lf>

SPL:SYS:REPLYWITHCMD OFF<cr><lf>

OK<cr><lf>

SPL:GET LAS<cr><lf>

75.0<cr><lf>

COMMAND DETAILS



NOT AVAILABLE IN

I²C

GET WINDOW FILTER THRESHOLD **SYSTEM** HELP

SPL:SYS:ERRORS:VERBOSE <ON | OFF>

Control the state (enable or disable) of the printing error descriptions

| REQUEST | RESPONSE |
|----------------------------|----------|
| SPL:SYS:ERRORS:VERBOSE ON | OK |
| SPL:SYS:ERRORS:VERBOSE OFF | OK |

Description

When enabled the error messages will display the error description after the error code. By default, this command is disabled

| REQUEST | RESPONSE | EXAMPLE |
|------------------------------------|----------------------------------|---------|
| SPL:SYS:ERRORS:VERBOSE ON<cr> | OK<cr><lf> | |
| SPP:GET LAF<lf> | ERR 01 Invalid command<cr><lf> | |
| SPL:GET G<cr><lf> | ERR 03 Invalid parameter<cr><lf> | |
| SPL:SYS:ERRORS:VERBOSE OFF<cr><lf> | OK<cr><lf> | |
| SPP:GET LAF<cr><lf> | ERR 01<cr><lf> | |

COMMAND DETAILS



NOT AVAILABLE IN

I²C

GET WINDOW FILTER THRESHOLD SYSTEM **HELP**

SPL:HELP

List commands

| REQUEST | RESPONSE |
|--|----------|
| SPL:HELP | <STRING> |
| Return a list of the existing commands | |
| Description | |

| REQUEST | RESPONSE | EXAMPLE |
|------------------|---|---------|
| SPL:HELP<cr><lf> | SPL:GET <argument><cr><lf> SPL:WINDOW:GET <argument><cr><lf> SPL:WINDOW:SIZE <argument><cr><lf> SPL:FILTER <A C><cr><lf> SPL:THOLD <argument(s)><cr><lf> SPL:SYS:INFO <argument><cr><lf> SPL:SYS:I2C:ADDR <address><cr><lf> SPL:SYS:RLED <ON OFF THOLD><cr><lf> SPL:SYS:PLED <ON OFF BLINK><cr><lf> SPL:SYS:CAL <level><cr><lf> SPL:SYS:FACTORYRESTORE<cr><lf> SPL:SYS:REPLYWITHCMD <ON OFF> <cr><lf> SPL:SYS:ERRORS:VERBOSE <ON OFF><cr><lf> | |

ERRORS

ERR 01

INVALID COMMAND

This error indicates that the received command could not be correctly processed. Normally this indicates that a wrong syntax was used or part of the command was misspelled

ERR 02

MISSING PARAMETER

This error occurs when a command is missing a parameter that is needed and was not provided. For example, this can occur if the mode is missing in a GET command

ERR 03

INVALID PARAMETER

This error occurs when the provided parameter is not one of the available options. This can occur, for example, if the user tries to select the filter G which does not exist

ERR 04

PARAMETER OUT OF BOUNDS

The provided parameter is lower than the minimum allowed value or higher than the maximum allowed value. Allowed values:

| | |
|--------------------------|-------------------------|
| Window Size | 1 - 15 |
| Threshold | 30 - 130 |
| I ² C Address | 1 - 127 |
| Calibration (CAL) | 50 - 115 (linear range) |
| Percentile number | 1 - 99 |

ERR 05

WRONG FILTER SELECTED

This error indicates that the request acoustical mode measurement has a different weighting filter defined

ERR 13

COMMAND NOT AVAILABLE IN I²C

The requested command is not available in I²C mode

Exclusive Error in I²C

ERR 20

INPUT LEVEL IS UNSTABLE

The calibration failed because the sound source, used to calibrate the SPL, is unstable or there is environment noise that is interfering with the calibration procedure

Exclusive Error in Calibration

I²C REFERENCE

I²C CHARACTERISTICS

- The SPL works in slave mode
- The master should set the clock of 100kHz
- Default I²C SPL address is decimal 85
- I²C commands must not exceed 32 bytes

FUNCTIONAL WORKFLOW

- 1 Send the command to I²C SPL address
- 2 Wait 5 ms, to allow SPL to process the command
- 3 Request the response from SPL (32 bytes or less)*

I²C COMMANDS

- I²C commands and requested responses must not exceed 32 bytes
- If the I²C command is larger than 32 bytes it should be split in several messages
- The responses are all 32 bytes or less. If the master is unsure of the response length it should request 32 bytes. The remaining bytes after the terminator characters will be 0

*In the case of receiving an ERR 11 or ERR 12, the master should wait a few milliseconds and retry requesting the response (see I²C errors in EXCLUSIVE ERRORS section)

03 BYTE COMMANDS



COMMANDS

REQUEST

<command><bitmask>

RESPONSE

<resp[0]><resp[1]>....<resp[N]>

| COMMAND | MODE | REQUEST | | | | | | | | RESPONSE | |
|--------------------|--------------------|-----------|--------------|-------|-------|-------|-------|-------|-------|----------|-----------|
| | | <command> | <bitmask> | | | | | | | | <resp> |
| | | | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
| SPL:GET | LAS | 0x01 | X | X | X | X | X | X | X | 1 | float |
| | LASmax | 0x01 | X | X | X | X | X | X | 1 | X | float |
| | LASmin | 0x01 | X | X | X | X | X | 1 | X | X | float |
| | LAF | 0x01 | X | X | X | X | 1 | X | X | X | float |
| | LAFmax | 0x01 | X | X | X | 1 | X | X | X | X | float |
| | LAFmin | 0x01 | X | X | 1 | X | X | X | X | X | float |
| | LAEQ | 0x01 | X | 1 | X | X | X | X | X | X | float |
| | STATUS | 0x01 | 1 | X | X | X | X | X | X | X | float |
| SPL:GET & RESET | LAS | 0x02 | X | X | X | X | X | X | X | 1 | float |
| | LASmax | 0x02 | X | X | X | X | X | X | 1 | X | float |
| | LASmin | 0x02 | X | X | X | X | X | 1 | X | X | float |
| | LAF | 0x02 | X | X | X | X | 1 | X | X | X | float |
| | LAFmax | 0x02 | X | X | X | 1 | X | X | X | X | float |
| | LAFmin | 0x02 | X | X | 1 | X | X | X | X | X | float |
| | LAEQ | 0x02 | X | 1 | X | X | X | X | X | X | float |
| | STATUS | 0x02 | 1 | X | X | X | X | X | X | X | float |
| SPL:GET | RESET | 0x10 | | | | | | | | | 0x06 (OK) |
| SPL:WINDOW:GET | LAeq | 0x16 | X | X | X | X | X | X | X | 1 | float |
| | LAmx | 0x16 | X | X | X | X | X | X | 1 | X | float |
| | LAmn | 0x16 | X | X | X | X | X | 1 | X | X | float |
| | LA1 | 0x16 | X | X | X | X | 1 | X | X | X | float |
| | LA10 | 0x16 | X | X | X | 1 | X | X | X | X | float |
| | LA50 | 0x16 | X | X | 1 | X | X | X | X | X | float |
| | LA90 | 0x16 | X | 1 | X | X | X | X | X | X | float |
| | LA99 | 0x16 | 1 | X | X | X | X | X | X | X | float |
| SPL:WINDOW:GET:LAN | <percentile value> | 0x17 | <1 up to 99> | | | | | | | | float |
| SPL:WINDOW:SIZE | <value in minutes> | 0x18 | <1 up to 15> | | | | | | | | 0x06 (OK) |
| | ? | 0x18 | 0x00 | | | | | | | | integer |

EXAMPLES

SPL:GET LAS

Request

0x01 0x01

Command = GET

Bitmask = 0b00000001

Response

0x42 0x61 0xBB 0xF2

LAS = 56.4

SPL:GET LAEQ & SPL:GET STATUS

Request

0x01 0xC0

Command = GET

Bitmask = 0b11000000

Response

0x42 0x69 0xFE 0x90 0x43 0x51 0x00 0x00

LAEQ = 58.5

STATUS = 209

SPL:GET RESET

Request

0x10

Command = GET

Response

0x06

OK



04

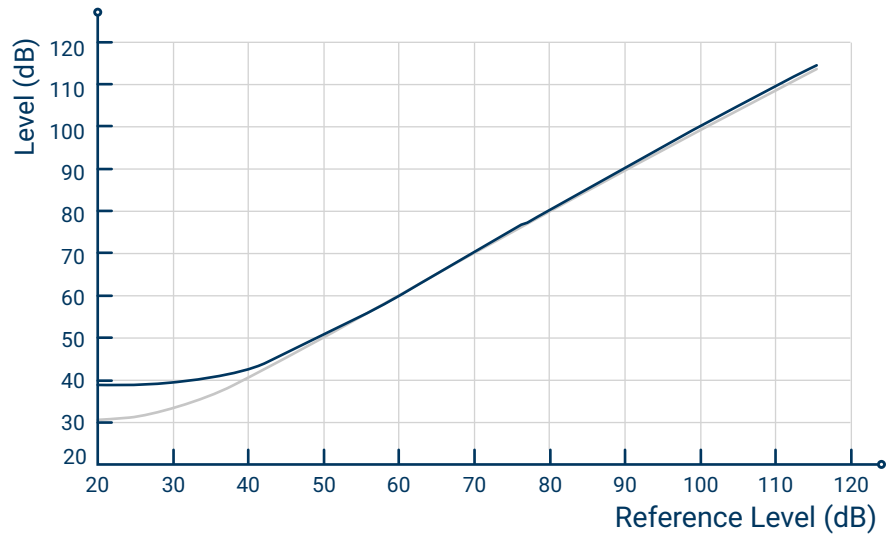
APPENDIX

PERFORMANCE

Amplitude Response (1 kHz)

Linearity comparison between the SPL Meter and a Class 2 reference equipment, using a fixed frequency tone of 1 kHz with varying amplitude.

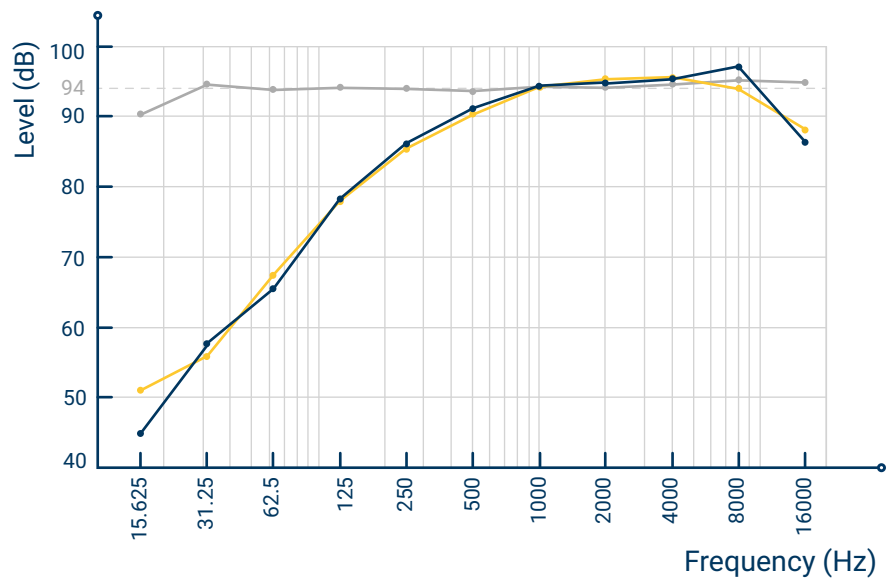
- Unparallel SPL
- Reference*



Frequency Response - A-Weighting

Comparison between A frequency weighting of the SPL Meter and the Class 2 Reference equipment in a free-field test with a sound emitter with fixed amplitude of 94 dB(z).

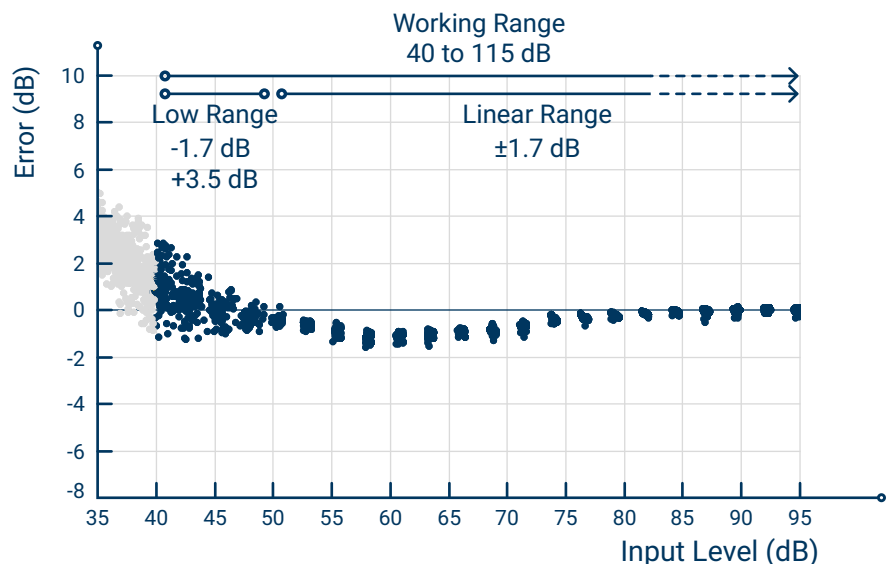
- Unparallel SPL A-Weighting
- Reference* A-Weighting
- Reference* Z-Weighting



Absolute Error (1 kHz) - Multiple Runs

Absolute error between the SPL Meter and the Class 2 reference device, taking into account multiple SPL devices and multiple runs with a tone of 1 kHz.

- Error (Unparallel SPL - Reference*)

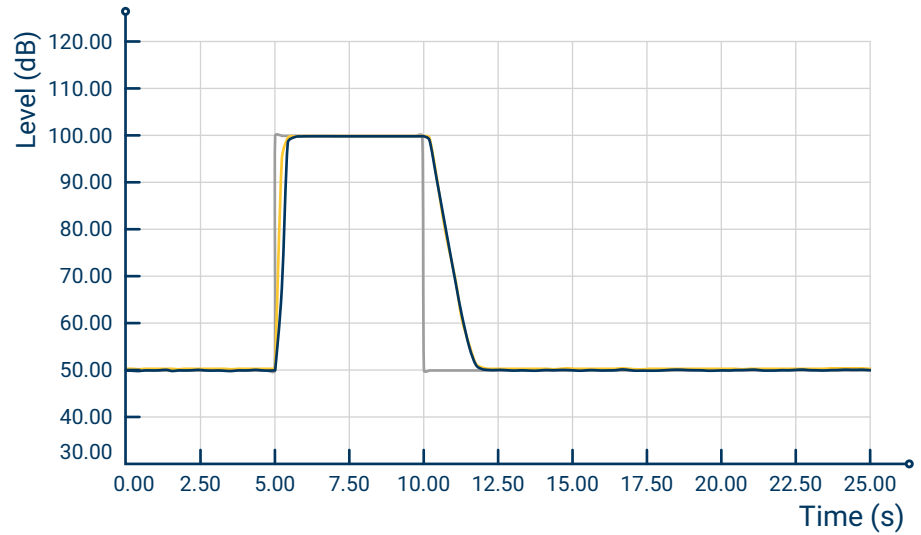


PERFORMANCE

Time Weightings - Fast

Step response comparison between SPL Meter and the Class 2 reference device with the Fast time constant ($\tau = 0.125$ s).

- SPL Fast
- Reference*
- Input Level



Time Weightings - Slow

Step response comparison between SPL Meter and the Class 2 reference device with the Slow time constant ($\tau = 1$ s).

- SPL Slow
- Reference*
- Input Level

