# ONECOM

# Online Experiment Communication

Described protocol version **1.0.0**

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Document revision history

|  |  |  |
| --- | --- | --- |
| **Protocol version** | **Changelog** | **Author** |
| **1.0.0** | Released first version | Morozov Arsenii L |

## Protocol transport

Protocol developed above USB Communication Device Class.

## Protocol basics

Protocol provides duplex data exchange, without receive confirmation. Messages integrity, order and delivery guarantee relies on USB layer. Both host and device can send messages without time limitations.

All data have Little-Endian

## Message structure

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section name | Header | | | Payload (optional) |
| Field name | Message type | Reserved | Payload length | Data |
| Bytes | [0] | [1-3] | [4-7] | [8-Payload length] |

All data sends in Little-endian format.

## Message types for sending from host to device

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0xAA | Measurements (data) |
| 0xAB | Set frequency |
| 0xAC | Set measurement type |
| 0xCA | Use default GMVs as references |
| 0xCB | Use calibrated GMVs as references |
| 0xCC | Use current GMVs as references |
| 0xCD | Store current GMVs as calibrated GMVs |
| 0xDD | Change IFR of debug GMV |

## Message types for sending from device to host

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0xBA | Single slope |
| 0xBB | Double slopes |
| 0xDC | Debug FFT |
| 0xDF | Debug GMV |

## Message “Measurements”

Message contains measurements. Message internally by USB system can be divided on packets, depending on measurements number sending over message. Measurements sends without timestamp and measurements must have stable sample frequency. Measurements sends in double precision float point format. Message with measurements have following structure

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Section name | Header | | | Payload | | |
| Field name | Message type | Reserved | Payload length | Meas. 1 | … | Meas. N/8 |
| Value | 0xAA | 0x00 | N | <> (double) | … | <> (double) |
| Bytes | [0] | [1-3] | [4-7] | [8-15] | … | [(N-7-8)-(N-8)] |

## Message “Set frequency”

Message set frequency sets sample frequency of the measurement, in order to internally calculate timestamps and frequencies. Frequency sends in unsigned 32-bit format, so frequency range is 0-4294967295. Message with frequency have following structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section name | Header | | | Payload |
| Field name | Message type | Reserved | Payload length | Frequency |
| Value | 0xAA | 0x00 | 4 | <> (uint32) |
| Bytes | [0] | [1-3] | [4-7] | [8-11] |

## Message “Set measurement type”

Message used to set type of measured signals. Measurement type is single byte value with uint8 type. Message have following structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section name | Header | | | Payload |
| Field name | Message type | Reserved | Payload length | Measurement type |
| Value | 0xAA | 0x00 | 1 | <> (uint8) |
| Bytes | [0] | [1-3] | [4-7] | [8] |

Supported measurement types:

|  |  |
| --- | --- |
| Value | Measurement type |
| 0x00 | Current from single phase |
| 0x01 | Radial vibrations |
| 0x02 | Axial vibrations |

## Messages for manipulating with GMV

Messages “Use default GMVs as references”, “Use calibrated GMVs as references”, “Use current GMVs as references”, “Store current GMVs as calibrated GMVs” are payload less and have following values:

|  |  |
| --- | --- |
| Message type | Value |
| Use default GMVs as references | Use default (preconfigured) GMVs as reference GMV. Default value can’t be changed without reflashing firmware. |
| Use calibrated GMVs as references | Use calibrated GMVs (which stored in calibrations section on device) as reference GMV. To use this, some GMVs should be stored in calibrations section previously. |
| Use current GMVs as references | Use current GMV (calculated based on received data) as reference. |
| Store current GMVs as calibrated GMVs | Store current reference GMV in calibrations section on the device. |

## Message “Change IFR of debug GMV”

Message used to change IFR (Information Frequency Range) of the GMV which sends for algorithm debugging. New IFR sends as unsigned 8-bit value uint8. Possible values: “1”,”2”. Message have following structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section name | Header | | | Payload |
| Field name | Message type | Reserved | Payload length | New IFR |
| Value | 0xAA | 0x00 | 1 | <> (uint8) |
| Bytes | [0] | [1-3] | [4-7] | [8] |

## Message “Single slope”

Message used to send calculated on device diagnostic information, namely single slope. Slope sends in double precision float point format. Message have following structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Section name | Header | | | Payload |
| Field name | Message type | Reserved | Payload length | Slope |
| Value | 0xAA | 0x00 | 8 | <> (double) |
| Bytes | [0] | [1-3] | [4-7] | [8-15] |

## Message “Double slopes”

Message very similar to single slope format, but sends 2 slopes obtained for 2 IFRs. Message have following structure:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section name | Header | | | Payload |  |
| Field name | Message type | Reserved | Payload length | Slope 1 | Slopes 2 |
| Value | 0xAA | 0x00 | 16 | <> (double) | <> (double) |
| Bytes | [0] | [1-3] | [4-7] | [8-15] | [16-23] |

## Message “Debug FFT”

Message sends array with calculated magnitude of the FFT spectrum (only half because, second half is similar). This message used to debug FFT computation. Each point have double precision float point format. Message have following structure:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Section name | Header | | | Payload | | |
| Field name | Message type | Reserved | Payload length | FFT point. 1 | … | FFT point. M/8 |
| Value | 0xAA | 0x00 | M | <> (double) | … | <> (double) |
| Bytes | [0] | [1-3] | [4-7] | [8-15] | … | [(M-7-8)-(M-8)] |

## Message “Debug GMV”

This message very similar to Debug FFT, but sends calculated GMV function to debug its calculation. Message have following structure:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Section name | Header | | | Payload | | |
| Field name | Message type | Reserved | Payload length | GMV point. 1 | … | GMV point. P/8 |
| Value | 0xAA | 0x00 | P | <> (double) | … | <> (double) |
| Bytes | [0] | [1-3] | [4-7] | [8-15] | … | [(P-7-8)-(P-8)] |