

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
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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
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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)]