# Channel Types

## CHANNEL\_TYPE\_LINEAR (0)

This channel type represents linear data packed back to back.

Linear channels require two channel coefficients (additional coefficients will be ignored). The first (index 0) coefficient is the linear scale, and the second (index 1) is the linear offset. These are used in the following manner:

Where Inputn is the integer value decoded from the stream packet, and Outputn is the floating point value, representing a measurement in the channel’s declared unit type.

Linear channels do not require any chunks. Any chunks present on the channel will be ignored.

Linear channels interpret negative bits per sample settings as meaning signed, and positive bits per sample as meaning unsigned. For example a bits per sample setting of -12 means 12-bit signed integers (twos complement representation). Likewise a bits per sample setting of 16 means 16-bit unsigned integers.

Linear channels require the number of channel data bits be at least samples \* abs(bits per sample).

Example with samples = 3, bits per sample = ±13, leading bit offset = 0:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte # | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Sample 0 [12:5] | | | | | | | |
| 1 | Sample 0 [4:0] | | | | | Sample 1 [12:10] | | |
| 2 | Sample 1 [9:2] | | | | | | | |
| 3 | Sample 1 [1:0] | | Sample 2 [12:7] | | | | | |
| 4 | Sample 2 [6:0] | | | | | | | unused |

Example with samples = 1, bits per sample = ±24, leading bit offset = 5:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte # | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | unused | | | | | Sample 0 [23:21] | | |
| 1 | Sample 0 [20:13] | | | | | | | |
| 2 | Sample 0 [12:5] | | | | | | | |
| 3 | Sample 0 [4:0] | | | | | unused | | |

## CHANNEL\_TYPE\_NTC (1)

This channel represents linear voltages taken from a Negative Temperature Coefficient (NTC) type thermistor in series with a biasing resistor.

NTC channels require three channel coefficients (additional coefficients will be ignored). The first (index 0) coefficient is the scale, the second (index 1) is the offset, and the third (index 2) is the NTC’s beta coefficient. These are used in the following manner:

Where Inputn is the integer value decoded from the stream packet, and Outputn is the floating point value, representing a measurement in the channel’s declared unit type.

NOTE: the only unit type that makes sense is UNIT\_TYPE\_CELSIUS, though this is not enforced.

Samples are decoded from the stream packet in the same manner as CHANNEL\_TYPE\_LINEAR.

## CHANNEL\_TYPE\_ARRAY (2)

TODO

## CHANNEL\_TYPE\_SLOW\_STRAIN (3)

TODO

Slow strain channels (like fast strain channels) have a 3rd coefficient, which is used to convert the raw data (before applying scale and offset) to a unit-less bridge ratio measurement. This is necessary for performing the bridge element resistance checks.

Slow strain channels (like fast strain channels) have a single chunk, which is interpreted in the following manner:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte # | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Positive Sense Resistor Value | | | | | | | |
| 1 |
| 2 |
| 3 |
| 4 | Negative Sense Resistor Value | | | | | | | |
| 5 |
| 6 |
| 7 |
| 8 | Bridge Element Nominal Resistance | | | | | | | |
| 9 |
| 10 |
| 11 |
| 12 | Bridge Element Minimum Resistance | | | | | | | |
| 13 |
| 14 |
| 15 |
| 16 | Bridge Element Maximum Resistance | | | | | | | |
| 17 |
| 18 |
| 19 |

## CHANNEL\_TYPE\_FAST\_STRAIN (4)

TODO

The fast strain channel types are decoded identically to CHANNEL\_TYPE\_LINEAR.

Fast strain channels (like slow strain channels) have a 3rd coefficient, which is used to convert the raw data (before applying scale and offset) to a unit-less bridge ratio measurement. This is necessary for performing the bridge element resistance checks.

Fast strain channels (like slow strain channels) have a single chunk, which is interpreted in the following manner:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte # | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Positive Sense Resistor Value | | | | | | | |
| 1 |
| 2 |
| 3 |
| 4 | Negative Sense Resistor Value | | | | | | | |
| 5 |
| 6 |
| 7 |
| 8 | Bridge Element Nominal Resistance | | | | | | | |
| 9 |
| 10 |
| 11 |
| 12 | Bridge Element Minimum Resistance | | | | | | | |
| 13 |
| 14 |
| 15 |
| 16 | Bridge Element Maximum Resistance | | | | | | | |
| 17 |
| 18 |
| 19 |

## CHANNEL\_TYPE\_SLOW\_ACCEL (5)

TODO

## CHANNEL\_TYPE\_PACKED\_ACCEL (6)

TODO

## CHANNEL\_TYPE\_COMPOSITE\_STRAIN (7)

TODO

## CHANNEL\_TYPE\_LINEAR\_ACCEL (8)

TODO