



## Application Note

USB-Int3\_PPM\_Gen Firmware

### Output Pins of USB-Interface III

Pin 16: PPM signal

Pin 6: GND

Signal amplitude +5V, can be directly feed into master trainer connector

### Communication Format

Virtual Physical layer UART

1 start, 8 data, 1 even parity, 1 stop

Frame format

PC → USB-Interface

Function	Start of Frame	channel 1 hi	channel 1 lo	...	channel 8 lo
Bits	1S <sub>6</sub> S <sub>5</sub> S <sub>4</sub> S <sub>3</sub> S <sub>2</sub> S <sub>1</sub> S <sub>0</sub>	0K <sub>13</sub> K <sub>12</sub> K <sub>11</sub> K <sub>10</sub> K <sub>9</sub> K <sub>8</sub> K <sub>7</sub>	0K <sub>6</sub> K <sub>5</sub> K <sub>4</sub> K <sub>3</sub> K <sub>2</sub> K <sub>1</sub> K <sub>0</sub>		

USB-Interface → PC

No Ack, received SoF: LED flashes

SoF - Start of Frame

MSB first, MSB always 1

s<sub>0</sub>: modulation (1: positiv, 0: negativ)

s<sub>1</sub> to s<sub>6</sub>: future use

Channel

Channel resolution 14 Bit: K<sub>13</sub>K<sub>12</sub>K<sub>11</sub>K<sub>10</sub>K<sub>9</sub>K<sub>8</sub>K<sub>7</sub>K<sub>6</sub>K<sub>5</sub>K<sub>4</sub>K<sub>3</sub>K<sub>2</sub>K<sub>1</sub>K<sub>0</sub>

0 ≈ impulse time 0.7 ms ≈ full deflexion left

2<sup>13</sup> ≈ impulse time 1.2 ms ≈ middle

2<sup>14</sup> - 1 ≈ impulse duration 1.7 ms ≈ full deflexion right

Channel coding:

14 bits partitioned on 2 bytes, MSB always 0

Conversion for PC software:

unsigned short channel

byte channel\_hi, channel\_lo

channel = value between 0.. 2<sup>14</sup> - 1

channel = channel << 1

channel\_hi = channel / 256

channel\_lo = channel mod 256

channel\_lo = channel\_lo >> 1

# Examples

