2CH wlan Digital Storage Oscilloscope
Velleman® nv has been an important wholesaler and developer of electronics for over 36 years. Our warehouses contain more than 18,000 different products of 50 brands. The distribution network includes more than 1,700 distributors in well over 85 countries. Velleman® nv has built up an excellent service reputation towards retailers. To meet the ever increasing growth, Velleman® nv expanded with new offices and showrooms as well as a new warehouse of 35,000m³ equipped with the latest in order picking technology. This represents an investment of over €5,500,000.
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Send ‘wifi settings request’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Wifi-settings-request-cmd> <Data_length_low_byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 8
Wifi settings request command: 0x0A
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A

Send ‘wifi settings’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Wifi-settings-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<Wifi-channel-low-byte> < Wifi-channel-high-byte>
<SSID-char1> <SSID-char2> <SSID-char3> … <SSID-char32>
>Password-char1> <Password-char2> <Password-char3> … <Password-char32>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 74
Wifi settings command: 0x0B
Wifi channel: 1…13
SSID: Up to 32 characters (not used characters = 0)
  Remark: At least one character must be used. Only the following characters are allowed: 0...9, a...z, A...Z, _ and -
Password: Up to 32 characters (not used characters = 0)
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A
Send ‘start calibration’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Start-calibration-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 8
Start calibration command: 0xCA
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A

Send ‘status request’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Status-request-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 8
Status request command: 0x10
Checksum: CHKSUM = 8-bit two’s complement of sum of all previous bytes
End of transmission: ETX = 0x0A
Send ‘settings’ from display device (Tablet or USB host) to WiFi Scope

<STX>
<Settings-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CH1-input-coupling> <CH1-V/div> <CH1-Yposition>
<CH2-input-coupling> <CH2-V/div> <CH2-Yposition>
<Timebase> <Trigger-level> <Trigger-setting> <reserved>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Data length: 18
Settings command: 0x11
CHx input coupling:
AC  0 DC  1 GND  2

CHx V/div:
Off  0  0.2 V/div  7
20 V/div  1  0.1 V/div  8
10 V/div  2  50 mV/div  9
4 V/div  3  25 mV/div 10
2 V/div  4  10 mV/div 11
1 V/div  5  5 mV/div 12
0.5 V/div  6

CHx Yposition: 3...252  (3 = top / 128 = center / 252 = bottom of screen)

Timebase:
1 µs/div  0  2 ms/div  10
2 µs/div  1  5 ms/div  11
5 µs/div  2  10 ms/div 12
10 µs/div  3  20 ms/div 13
20 µs/div  4  50 ms/div 14
50 µs/div  5  0.1 s/div  15
0.1 ms/div  6  0.2 s/div  16
0.2 ms/div  7  0.5 s/div  17
0.5 ms/div  8  1 s/div   18
1 ms/div  9

Trigger level: 3...252  (3 = top / 128 = center / 252 = bottom of screen)
**Trigger settings:**

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 0</td>
<td>Trigger mode (00 = Normal / 01 = Auto / 10 = Once)</td>
</tr>
<tr>
<td>2</td>
<td>Trigger slope (0 = rising edge / 1 = falling edge)</td>
</tr>
<tr>
<td>3</td>
<td>Trigger channel (0 = ch1 / 1 = ch2)</td>
</tr>
<tr>
<td>4</td>
<td>Run/Hold (0 = run / 1 = Hold)</td>
</tr>
<tr>
<td>5</td>
<td>Reserved</td>
</tr>
<tr>
<td>6</td>
<td>Reserved</td>
</tr>
<tr>
<td>7</td>
<td>Autorange (0 = autorange off / 1 = autorange on)</td>
</tr>
<tr>
<td>8...15</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

**Checksum:** CHKSUM = 8-bit two's complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A

**Remark:**

Setting the autorange:
- The Y-position and trigger level is forced to the center position.
- Triggermode is set to auto mode.
- The timebase and V/div will be automatically set to fit the waveform on screen.
- The V/div will be automatically set for the channels to fit the waveform on screen.

Into autorange:
- Changing the Y-position, trigger level, trigger mode, V/div or Timebase must switch the autorange off.

**Send ‘sample data request’ from display device (Tablet or USB host) to WiFi Scope**

```plaintext
<STX>  
.Sample-data-request-cmd> <Data-length-low-byte> <Data-length-high-byte>  
<0> <0>  
<CHKSUM>  
<ETX>  
```

**Start of transmission:** STX = 0x02

**Data length:** 8

**Sample data request command:** 0x12

**Checksum:** CHKSUM = 8-bit two’s complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A
Receive scope settings from WiFi Scope to display device (Tablet or USB host)

<STX>
>Status-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<CH1-input-coupling> <CH1-V/div> <CH1-Yposition>
<CH2-input-coupling> <CH2-V/div> <CH2-Yposition>
<Timebase> <Trigger-level> <Trigger-settings> <Module-status>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02

Settings command: 0x20
Data length: 18

CHx V/div:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>0</td>
<td>0.2 V/div</td>
</tr>
<tr>
<td>20 V/div</td>
<td>1</td>
<td>0.1 V/div</td>
</tr>
<tr>
<td>10 V/div</td>
<td>2</td>
<td>50 mV/div</td>
</tr>
<tr>
<td>4 V/div</td>
<td>3</td>
<td>25 mV/div</td>
</tr>
<tr>
<td>2 V/div</td>
<td>4</td>
<td>10 mV/div</td>
</tr>
<tr>
<td>1 V/div</td>
<td>5</td>
<td>5 mV/div</td>
</tr>
<tr>
<td>0.5 V/div</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

CHx Yposition: 3…252  (3 = top / 128 = center / 252 = bottom of screen)

Timebase:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 µs/div</td>
<td>0</td>
<td>2 ms/div</td>
</tr>
<tr>
<td>2 µs/div</td>
<td>1</td>
<td>5 ms/div</td>
</tr>
<tr>
<td>5 µs/div</td>
<td>2</td>
<td>10 ms/div</td>
</tr>
<tr>
<td>10 µs/div</td>
<td>3</td>
<td>20 ms/div</td>
</tr>
<tr>
<td>20 µs/div</td>
<td>4</td>
<td>50 ms/div</td>
</tr>
<tr>
<td>50 µs/div</td>
<td>5</td>
<td>0.1 s/div</td>
</tr>
<tr>
<td>0.1 ms/div</td>
<td>6</td>
<td>0.2 s/div</td>
</tr>
<tr>
<td>0.2 ms/div</td>
<td>7</td>
<td>0.5 s/div</td>
</tr>
<tr>
<td>0.5 ms/div</td>
<td>8</td>
<td>1 s/div</td>
</tr>
<tr>
<td>1 ms/div</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Trigger level: 3…252  (3 = bottom / 128 = center / 252 = bottom of screen)

Trigger settings:

Bit 1 & 0  Trigger mode (00 = Normal / 01 = Auto / 10 = Once)
Bit 2  Trigger slope (0 = rising edge / 1 = falling edge)
Bit 3  Trigger channel (0 = ch1 / 1 = ch2)
Bit 4  Run/Hold (0 = run / 1 = Hold)
Bit 5  Reserved
Bit 6  Reserved
Bit 7  Autorange (0 = autorange off / 1 = autorange on)
Module status:

Bit 0  Charger Power-Good status
Bit 1  Charge Status 2
Bit 2  Charge Status 1

<table>
<thead>
<tr>
<th>Status</th>
<th>Bit 2 (Stat 1)</th>
<th>Bit 1 (Stat 2)</th>
<th>Bit 0 (PG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No USB power present</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>No battery present</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low battery</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Temperature fault</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Charging complete</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Charging</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Bit 3  0
Bit 4  Calibrating (0 = off / 1 = busy)
Bit 5  Low battery (1 = low battery)

Checksum: CHKSUM = 8-bit two's complement of sum of all previous bytes

End of transmission: ETX = 0x0A

Receive scope sample data from WiFi Scope to display device (Tablet or USB host)

<STX>
<Sample-data-cmd> <Data-length-low-byte> <Data-length-high-byte>
<Offset-low-byte> <Offset-high-byte>
<CH1-input-coupling> <CH1-V/div> <CH1-Yposition>
<CH2-input-coupling> <CH2-V/div> <CH2-Yposition>
<Timebase> <Trigger-level> <Trigger-settings> <Module-status>
.Sample-1-ch1> <Sample-1-ch2> <Sample-2-ch1> <Sample-2-ch2> ... <Sample-n-ch1> <Sample-n-ch2>
<CHKSUM>
<ETX>

Start of transmission: STX = 0x02
Settings command: 0x21
Data length: 18 + (2 x number of samples/channels)
Offset: X-position of sample buffer

CHx V/div:

<table>
<thead>
<tr>
<th>Off</th>
<th>0.2 V/div</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 V/div</td>
<td>0.1 V/div</td>
<td>8</td>
</tr>
<tr>
<td>10 V/div</td>
<td>0.05 V/div</td>
<td>9</td>
</tr>
<tr>
<td>5 V/div</td>
<td>0.025 V/div</td>
<td>10</td>
</tr>
<tr>
<td>2 V/div</td>
<td>0.01 V/div</td>
<td>11</td>
</tr>
<tr>
<td>1 V/div</td>
<td>0.005 V/div</td>
<td>12</td>
</tr>
<tr>
<td>0.5 V/div</td>
<td>0.0025 V/div</td>
<td>13</td>
</tr>
</tbody>
</table>
**CHx Yposition:** 3...252  
(3 = top / 128 = center / 252 = bottom of screen)

**Timebase:**

<table>
<thead>
<tr>
<th>Timebase</th>
<th>Yposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 µs/div</td>
<td>0</td>
</tr>
<tr>
<td>2 µs/div</td>
<td>1</td>
</tr>
<tr>
<td>5 µs/div</td>
<td>2</td>
</tr>
<tr>
<td>10 µs/div</td>
<td>3</td>
</tr>
<tr>
<td>20 µs/div</td>
<td>4</td>
</tr>
<tr>
<td>50 µs/div</td>
<td>5</td>
</tr>
<tr>
<td>0.1 ms/div</td>
<td>6</td>
</tr>
<tr>
<td>0.2 ms/div</td>
<td>7</td>
</tr>
<tr>
<td>0.5 ms/div</td>
<td>8</td>
</tr>
<tr>
<td>1 ms/div</td>
<td>9</td>
</tr>
</tbody>
</table>

**Trigger level:** 3...252  
(3 = top / 128 = center / 252 = bottom of screen)

**Trigger settings:**

- Bit 1 & 0  
  Trigger mode (00 = Normal / 01 = Auto / 10 = Once / 11 = Roll)

- Bit 2  
  Trigger slope (0 = rising edge / 1 = falling edge)

- Bit 3  
  Trigger channel (0 = ch1 / 1 = ch2)

- Bit 4  
  Run/Hold (0 = run / 1 = Hold)

- Bit 5  
  Reserved

- Bit 6  
  Reserved

- Bit 7  
  Autorange (0 = autorange off / 1 = autorange on)

**Module status:**

- Bit 0  
  Charger Power-Good status

- Bit 1  
  Charge Status 2

- Bit 2  
  Charge Status 1

**Status**

<table>
<thead>
<tr>
<th>Status</th>
<th>Bit 2 (Stat 1)</th>
<th>Bit 1 (Stat 2)</th>
<th>Bit 0 (PG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No USB power present</td>
<td>High</td>
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</tr>
<tr>
<td>No battery present</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low battery</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Temperature fault</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Charging complete</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Charging</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

- Bit 3  
  0

- Bit 4  
  Calibrating (0 = off / 1 = busy)

- Bit 5  
  Low battery (1 = low battery)

**Sample buffer:** Channel 1 & channel 2 samples (3 = top / 128 = center / 252 = bottom of screen)

For all timebase settings: 50 samples/div except for 1µs/div: 10 samples/div and for 2µs/div: 20 samples/div

**Checksum:** CHKSUM = 8-bit two’s complement of sum of all previous bytes

**End of transmission:** ETX = 0x0A
Receive WiFi settings from WiFi Scope to display device (Tablet or USB host)

<STX>
<Status-wifi-settings-cmd> <Data-length-low-byte> <Data-length-high-byte>
<0> <0>
<WiFi-channel-low-byte> <WiFi-channel-high-byte>
<SSID-char1> <SSID-char2> <SSID-char3> ... <SSID-char32>
<Password-char1> <Password-char2> <Password-char3> ... <Password-char32>
<Build-digit1> <Build-digit2> <Build-digit3> <Build-digit4>
<WiFi-Firmware-version-char1> <WiFi-Firmware-version-char2> ... <WiFi-Firmware-version-char16>
<CHKSUM>
<ETX>

Start of transmission: TX = 0x02  
Data length: 94  
Status WiFi settings command: 0x22  
WiFi channel: 1...13  
SSID: Up to 32 characters (not used characters = 0)  
Password: Up to 32 characters (not used characters = 0)  
Build: 4 characters for scope firmware build  
Version: Up to 16 characters for wifi module scope firmware version  
Checksum: CHKSUM = 8-bit two's complement of sum of all previous bytes  
End of transmission: ETX = 0x0A
WiFi Scope 2 channels 10MS/s

WFS210

Features
- two independent channels
- high sensitivity: up to 0.2mV
- full auto setup function
- signal markers
- hold function
- probe x1/x10 function
- DVM readouts
- fully documented protocol
- Li-ion rechargeable battery included

Specifications
- input range: 5mV to 20V/div (12 steps)
- timebase: 1µs to 1s/div
- max. 30Vpp input
- bandwidth: 2 x 10MHz (-3dB at selected ranges)
- real time sample rate: 2 x 10MS/s
- input impedance: 1Mohm
- input coupling: AC, DC and GND
- AD resolution: 8 bit
- sample buffer: 4K/channel
- readouts: DC, AC+DC, True RMS, dBm, Vpp, Vmin, Vmax.
- power consumption (battery): 160mA (max.)
- battery: Li-ion 3.7V 1800mAh
- USB charge current: 5V/500mA max.
- weight: 180g (0.39lb)
- dimensions: 100 x 100 x 35mm / 3.9 x 3.9 x 1.4"

Minimum system requirements:
- iOS (*)
- Android™ 4.0 (*)
- Windows XP or higher (*)
- Tablet or PC

(*) iOS is a trademark of Apple Inc.
(*) Android is a trademark of Google Inc.
(*) Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

The Velleman WFS210 is the world’s first wlan dual channel digital storage oscilloscope geared towards tablet computers. The WFS210 is a compact, portable battery powered fully featured two channel oscilloscope. Instead of a built-in screen it uses your tablet (iOS, Android™ or PC(Windows)) to display the measurements. Data exchange between the tablet and the oscilloscope is via wlan.