


# Study Watch Use-cases


Basic modes of operation have been designed for the Study Watch that are selectable by supplied Device Configuration Files. These are the different use-cases:


- High Performance PPG
- Synchronized PPG with EDA
- Synchronized PPG with ECG spot-check
- High Performance ECG spot-check
- Multi-wavelength PPG
- PPG with BIA

These modes of operation are intended to demonstrate the different types of configurations that are possible with the Study Watch but are not specific to an end-application. Users can load these Use Cases as a known-good starting point to explore measurements of interest before modifying the platform for their specific purpose. These use cases are show cased from the Application Wavetool. And also available as samples from the Study watch SDK.

<b><u>Use Case1: High Performance PPG</u></b>	Data Rate = 8020 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
PPG @500 Hz	32bit Mode
Accelerometer @50 Hz	8g Mode
Skin Temp @1 Hz	16bit temperature value
Signal Quality Index (SQI) @100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only for Green LED with ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM stream @1sec	HR value(16bit)
Pedometer@1Hz	32bit
Display	On or Off
Battery Life (streaming over BLE)	~18hrs (Display = Off)
Battery Life (recording to Flash)	~18hrs (Display = Off)
Logging Default	OFF by default. User has the option to enable logging from AWT

Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>
<b><u>Use Case 2: Synchronized PPG with EDA</u></b>	Data Rate = 2464 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
PPG @ 100 Hz	32bit Mode
Accelerometer @ 50 Hz	8g Mode
EDA at @ 30 Hz	<p>Wearing on wrist with the bottom electrodes measuring the skin impedance. See image:</p> 
Skin Temp @ 1 Hz	16bit temperature value
Signal Quality Index (SQI) @ 100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only for Green LED with ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM @ 1sec	HR value (16bit)
Pedometer@ 1Hz	32bit
Display	On or Off
Battery Life (streaming over BLE)	~63hrs (Display = Off)
Battery Life (recording to Flash)	~63hrs (Display = Off)
Logging Default	OFF by default. User has the option to enable logging from AWT

Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1.</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>
<b><u>Use Case 3: Synchronized PPG + ECG spot check</u></b>	Data Rate = 3822 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
PPG @100 Hz	32bit Mode
Accelerometer @50 Hz	8g Mode
ECG @300Hz	<p>Wear watch on one hand and touch the top electrodes with index finger and thumb of the second(other) hand.</p> <p>Ensure that no part of the second hand should touch the wearing hand during this process. See image:</p> 
Skin Temp @1 Hz	16bit temperature value
Signal Quality Index (SQI) @100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only for Green LED with ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM @1sec	HR value (16bit)
Pedometer@1Hz	32bit
Battery Life (streaming over BLE)	~43hrs (Display = Off)
Battery Life (recording to Flash)	~43hrs (Display = Off)

Logging Default	OFF by default. User has the option to enable logging from AWT
Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1.</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>
<b><u>Use Case 4: High Performance ECG Spot Check</u></b>	Data Rate =7139 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
PPG @50 Hz	32bit Mode
Accelerometer @50 Hz	8g Mode, match XL ODR to PPG
ECG @1000Hz	<p>Wear watch on one hand and touch the top electrodes with index finger and thumb of the second(other) hand.</p> <p>Ensure that no part of the second hand should touch the wearing hand during this process. See image:</p> 
Skin Temp @1 Hz	16bit temperature value
Signal Quality Index (SQI) @100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only for Green LED with ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM @1sec	HR value(16bit)
HRV @50Hz	16bit - RMSSD, RR Interval

Battery Life (streaming over BLE)	~22hrs (Display = Off)
Battery Life (recording to Flash)	~22hrs (Display = Off)
Logging Default	OFF by default. User has the option to enable logging from AWT
Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1.</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>
<b><u>Case5: Multiwavelength PPG</u></b>	Data Rate = 6539 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
All four LEDs PPG: Green, Red, IR, Blue @100Hz both channels	32bit Mode
Accelerometer @50Hz	8g Mode
Signal Quality Index (SQI) @100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only for Green LED with ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM @1Hz	HR value(16bit) from Green LED
Pedometer@1Hz	32bit
Battery Life (streaming over BLE)	~23hrs (Display = Off)
Battery Life (recording to Flash)	~23hrs (Display = Off)
Logging Default	OFF by default. User has the option to enable logging from AWT

Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1.</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>
<b><u>Use Case 6: PPG with BIA</u></b>	Data Rate = 3109 bytes/sec
<b>Primitives</b>	<b>Sensor Operating Condition</b>
PPG @ 100 Hz	32bit Mode
Accelerometer @50 Hz	8g Mode
BIA @20 Hz	<p>Wear watch on one hand and touch the top electrodes with index finger and thumb of the second(other) hand.</p> <p>Measures body impedance (32-bit real and 32-bit imaginary values)</p>
BCM @ 20Hz	<p>Wear watch on one hand and touch the top electrodes with index finger and thumb of the second(other) hand.</p> <p>Measures FFM, FP% &amp; BMI in floating point format</p>
Skin Temp @1 Hz	16bit temperature value
Signal Quality Index (SQI) @100Hz, packet every 5.12sec	Float value in range [0.0 to 1.0], Supported only if ADPD sampling rate is 25Hz, 50Hz or 100Hz
HRM @1sec	HR value (16bit)
Pedometer@1Hz	32bit
Display	On or Off
Battery Life (streaming over BLE)	~63hrs (Display = Off)
Battery Life (recording to Flash)	~63hrs (Display = Off)
Logging Default	OFF by default. User has the option to enable logging from AWT

Capacitive sensing	<p>Top touch is disabled now. Bottom touch capacitive sensing is part of Low Touch application Mode0 and Mode1.</p> <p>Backlight can be turned Off from Settings --&gt;Brightness, with which it remains OFF always.</p> <p>If turned On, Backlight turns On and then Backlight goes off with 30 sec of inactivity. Key press turns ON the backlight.</p>