

G-Link-200[®] Wireless Accelerometer Programmable Low-Pass and High-Pass Filter

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FILTER OVERVIEW

The G-Link-200 and G-Link-200-OEM wireless accelerometers provide two filter stages for limiting bandwidth and maintaining excellent noise performance. The first stage is an analog, fixed frequency, anti-aliasing filter with 3 dB attenuation at 800 Hz, and 6.18 dB attenuation at 1500 Hz.

The second is a user adjustable digital decimation filter. The decimation filter allows the cutoff frequency to be set between 26 Hz and 800 Hz. To minimize aliasing, it is recommended that users set the low-pass filter to a frequency $\frac{1}{4}$ that of the sample rate or less.

Combined, the filters achieve a flat passband and approximately 40 dB/decade roll-off. Additionally, the wireless accelerometer offers a digital high-pass filter (HPF) which may be enabled or disabled. A block diagram of the G-Link-200 and Bode plots for each filter setting are available below.

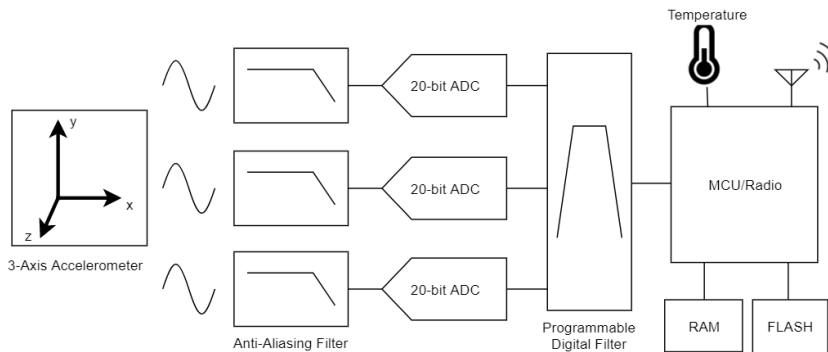
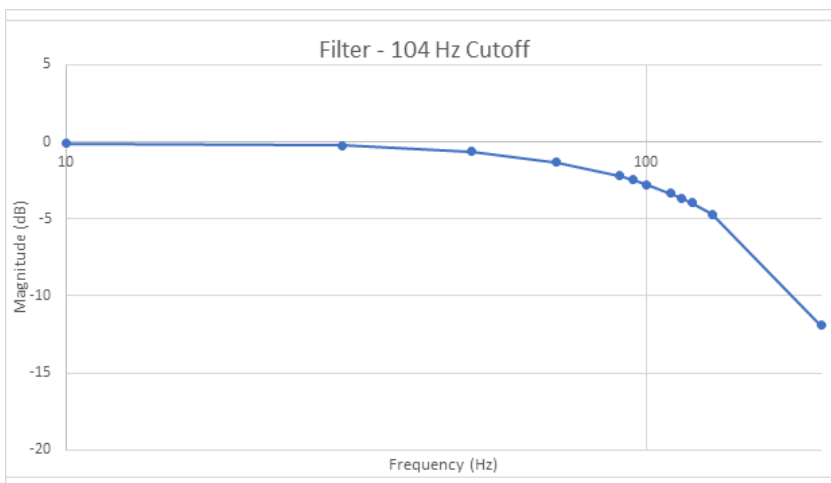
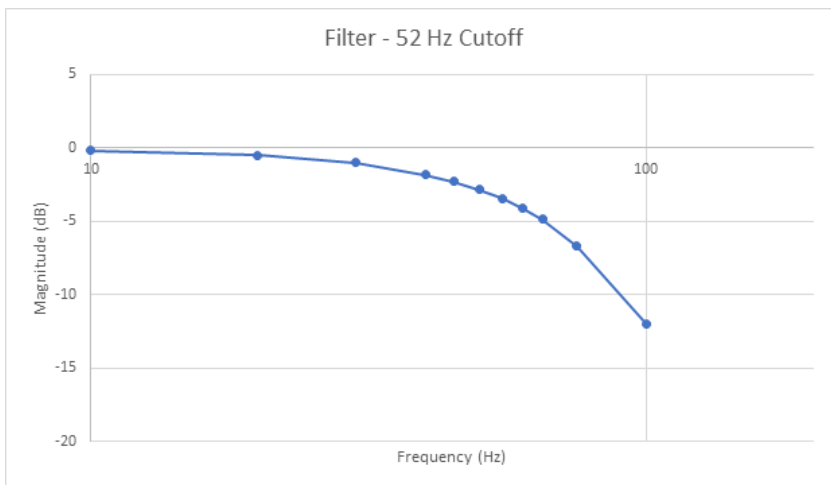
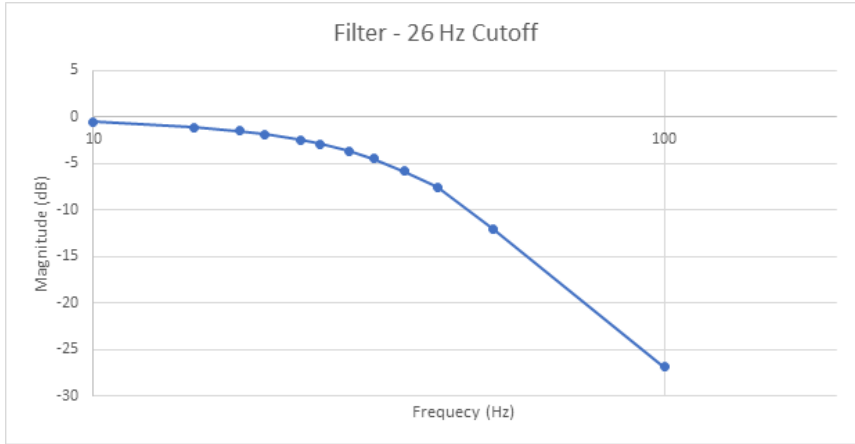


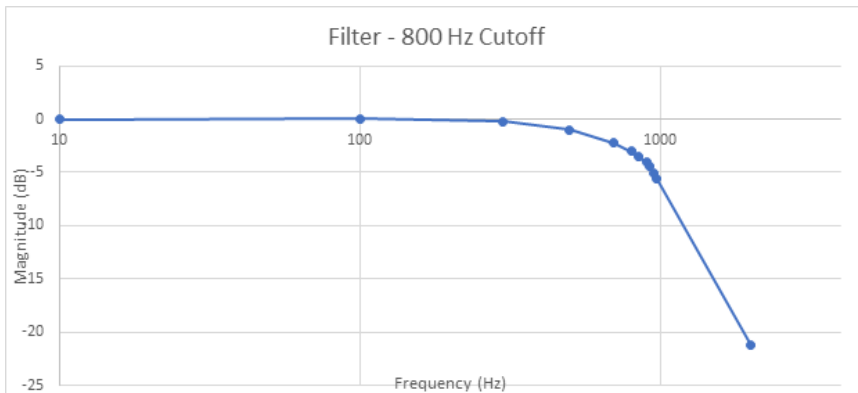
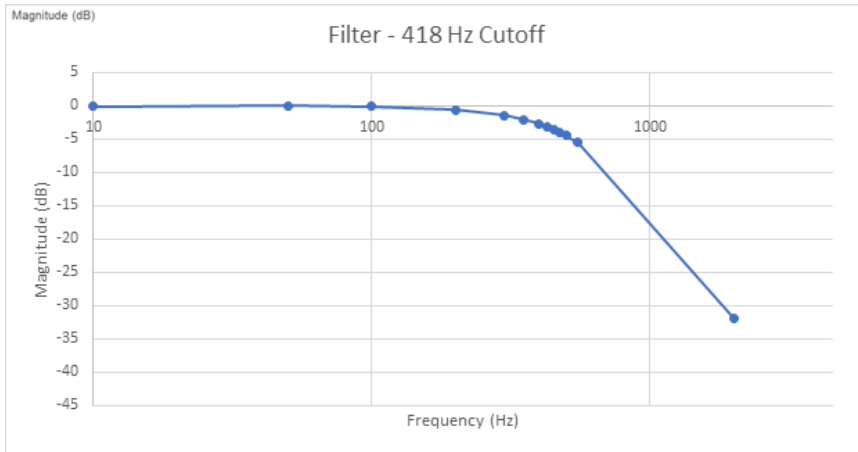
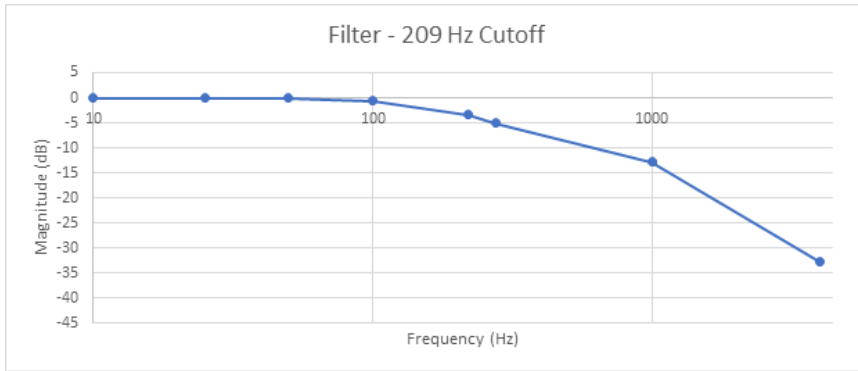
Figure 1. G-Link-200 Electrical Block Diagram.

FREQUENCY RESPONSE

The following images are Bode plots displaying the frequency response of a G-Link-200 using each of the low-pass filter settings. These plots were derived by collecting data from G-Link-200 nodes mounted to a shaker table. The shaker table produces 60 Hz noise with an amplitude of ~18 mg.



LORD Sensing TECHNICAL NOTE



GROUP DELAY

Group Delay is the time delay of the signal amplitude imparted by the low-pass filter. See the table below for group delay values corresponding to the low-pass filter configuration.

Low-pass Filter (Hz) at -3 dB	Group Delay (ms)
800	0.88
418	1.51
209	2.75
104	5.27
52	10.31
26	20.38

Table 1. Group Delay.

HIGH-PASS FILTER

The G-Link-200 contains an optional high-pass filter which is disabled by default. The HPF should be enabled for most vibration monitoring applications, specifically applications where the derived channels, RMS, velocity, or crest factor are being used.

When enabled, the high-pass filter corner frequency is determined by the low-pass filter setting. Use the table below to determine the HPF cutoff frequency.

Low-pass Filter (Hz)	Resulting High-pass Filter (Hz)
800	2.48
418	1.24
209	2.48
104	1.24
52	0.62
26	0.31

Table 2. Resulting HPF Cutoff Frequency.