Comparative Magnetic Field levels Tesla Model S & Honda CRV

By Lawrence Gust

Feb 28, 2013

On February 20 the Tesla Model S was driven in a normal manner around downtown Seattle in a combination of acceleration, deceleration and waiting a traffic lights. Preliminary measurements showed the fields were highest at floor level and decreased off with distance from the floor.

Magnetic field level versus time was then collected during driving time by placing the meter on the floor pan and on the lap both at the front passenger side and the driver's side. Passenger side, front floor fields are about 20% less than the driver's side. The lap field is about twice as the driver's side.

For comparison purposes data was collected in a 2007 Honda CRV from the driver's side floor and driver's lap only in normal stop and go driving in Ventura, CA. on February 28, 2013.

The character of the fields is highly variable at every location in both cars with frequent pulsing to higher magnetic field levels. Higher frequency components were present in both cars. In the Tesla magnetic field components less than 2000 Hz dominated. This was not the case in the Honda. Surprisingly, the field components at frequencies above 2000 were virtually absent.

The driver's lap average field level is higher in the Honda compared to the Tesla by a factor of two times. And the field spikes in the Honda are higher than the Tesla by a factor of three times.

The Tesla driver's floor total average field is higher and compared to the Honda by a factor of three times. However, the field spikes in the Honda from frequencies <2000 Hz were 45% higher than the Tesla.

The actual frequencies found and their relative predominance are different between the two cars. People differ in their sensitivity to frequencies so could be different reaction to one car over the other based on this.

Steel belted radial tire are reported to produce varying magnetic fields the frequency of which depend on wheel rotation rate. No magnetic fields seem to be visible in the traces from either car that would correspond to this type of slower variation.

So you can see that there is no clear cut winner one car over the other so far as magnetic field exposure is concerned, but there may be differences in individual comfort based on frequency sensitivities. Additionally, one cannot forget that most newer cars have Bluetooth radio frequency (RF)radiation that connects wireless devices to the car audio system. This was not measured, but the RF radiation is quite powerful.

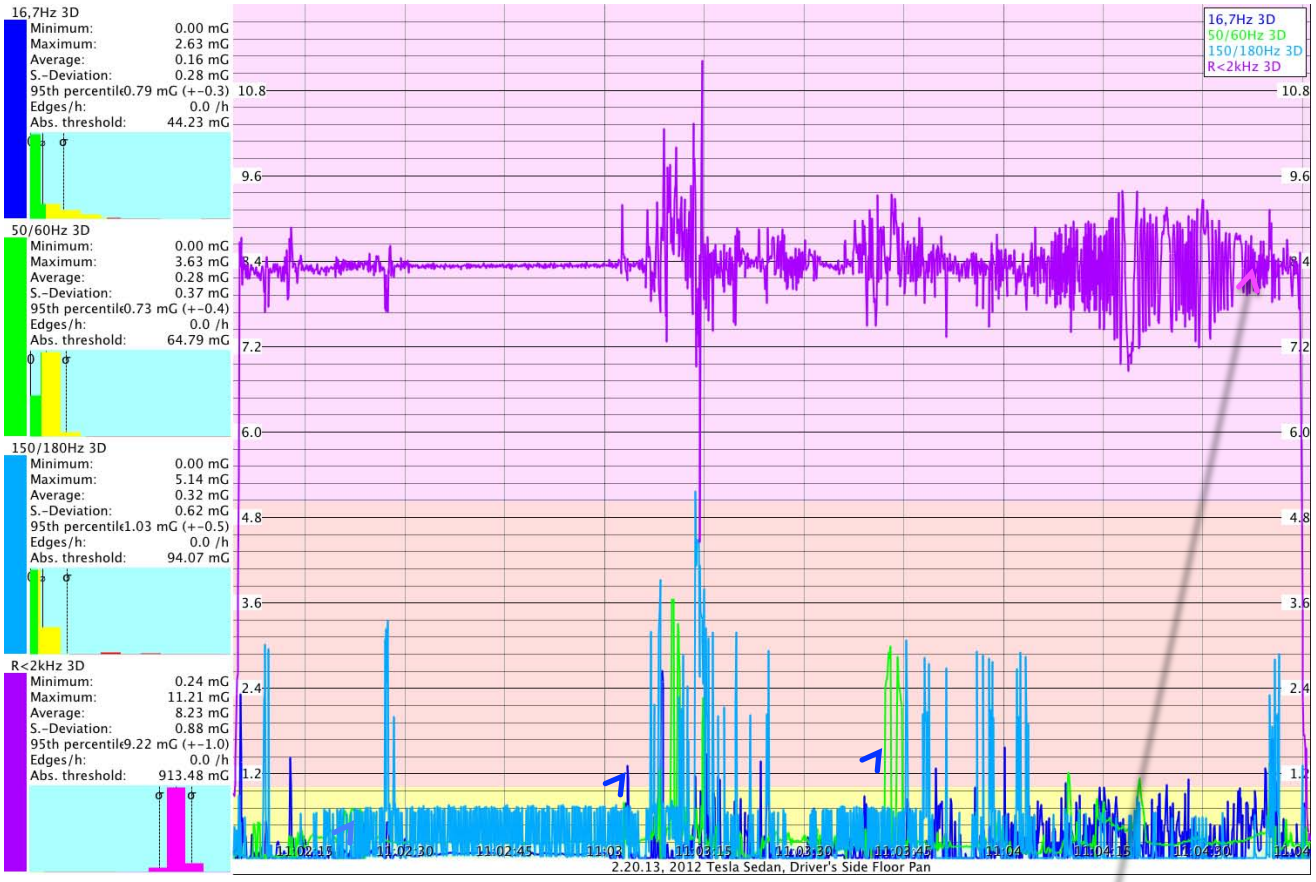
Tesla Driver's Side Floor

The total field (red) is covered up by the purple <2000Hz components by compressing the Y-scale. The total field average is 8.3 mG with a maximum of 11.7 mG. nearly the same as the <2000 Hz.

The highest component field level (in purple) is from the frequency components less than (<) 2000 Hz (mG). This field level averaged 8.4 milliGauss and with peaks to 11.2 mG. Note: Frequency components shown for <2000 Hz do not include those separately reported (16.7, 50, 60, 150, 180 Hz). This frequency separation is imposed by the instrument which is designed to measure electric power system fields.

There is very little magnetic field from frequencies >2000 Hz.

There are much smaller, although still significant, magnetic frequency components at 150, 180, 50, 60, 16.7 Hertz. Note that even with the smaller components there is still spiking to several milliGauss.



150 & 180 Hz

16.7 Hz

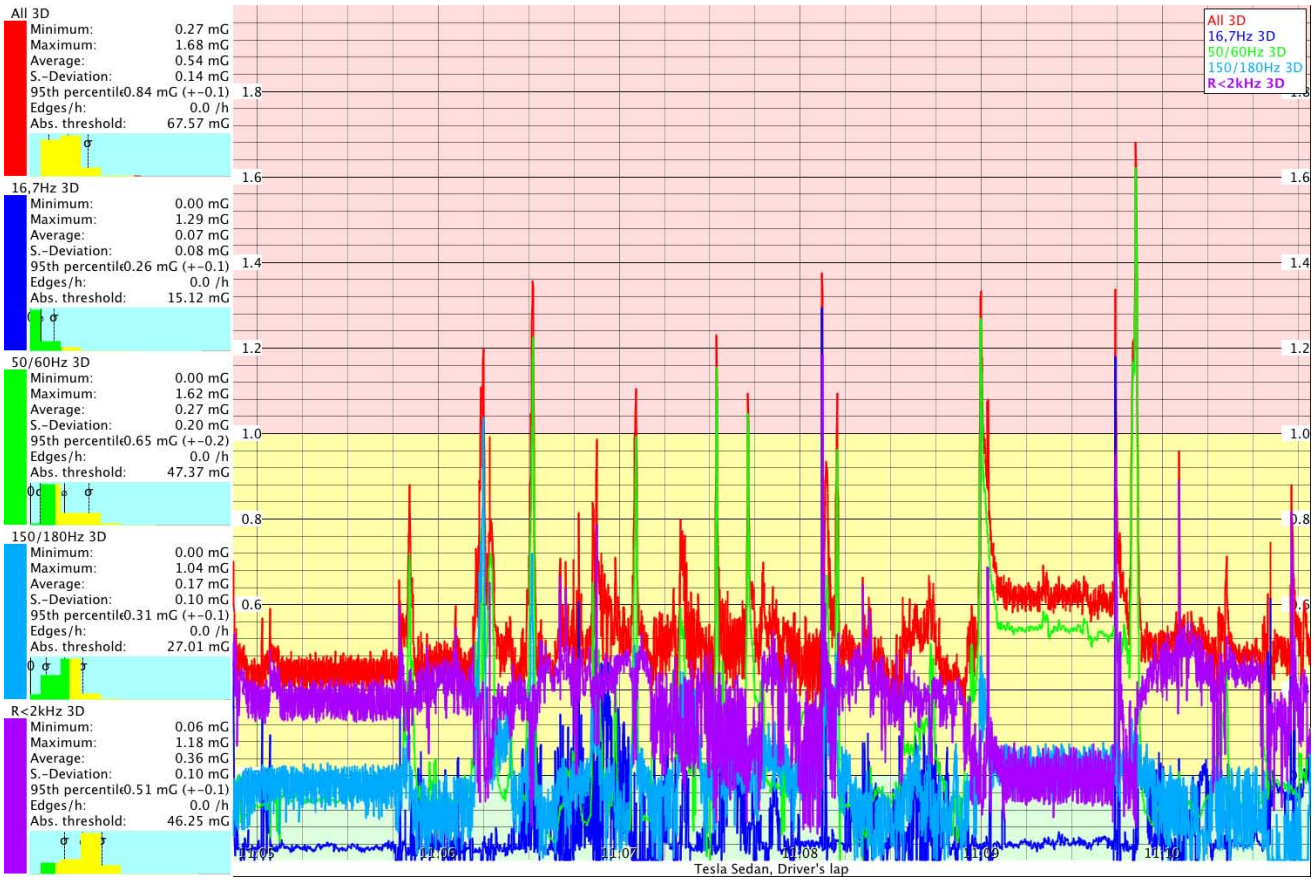
60 Hz

Frequencies < 2000Hz not including those separately listed

Tesla Driver's Lap

Magnetic field levels are reduced at the seat. (note the Y-scale has changed from the graph above.) The total field (red) average is 0.54 mG, maximum is 1.7 mG.

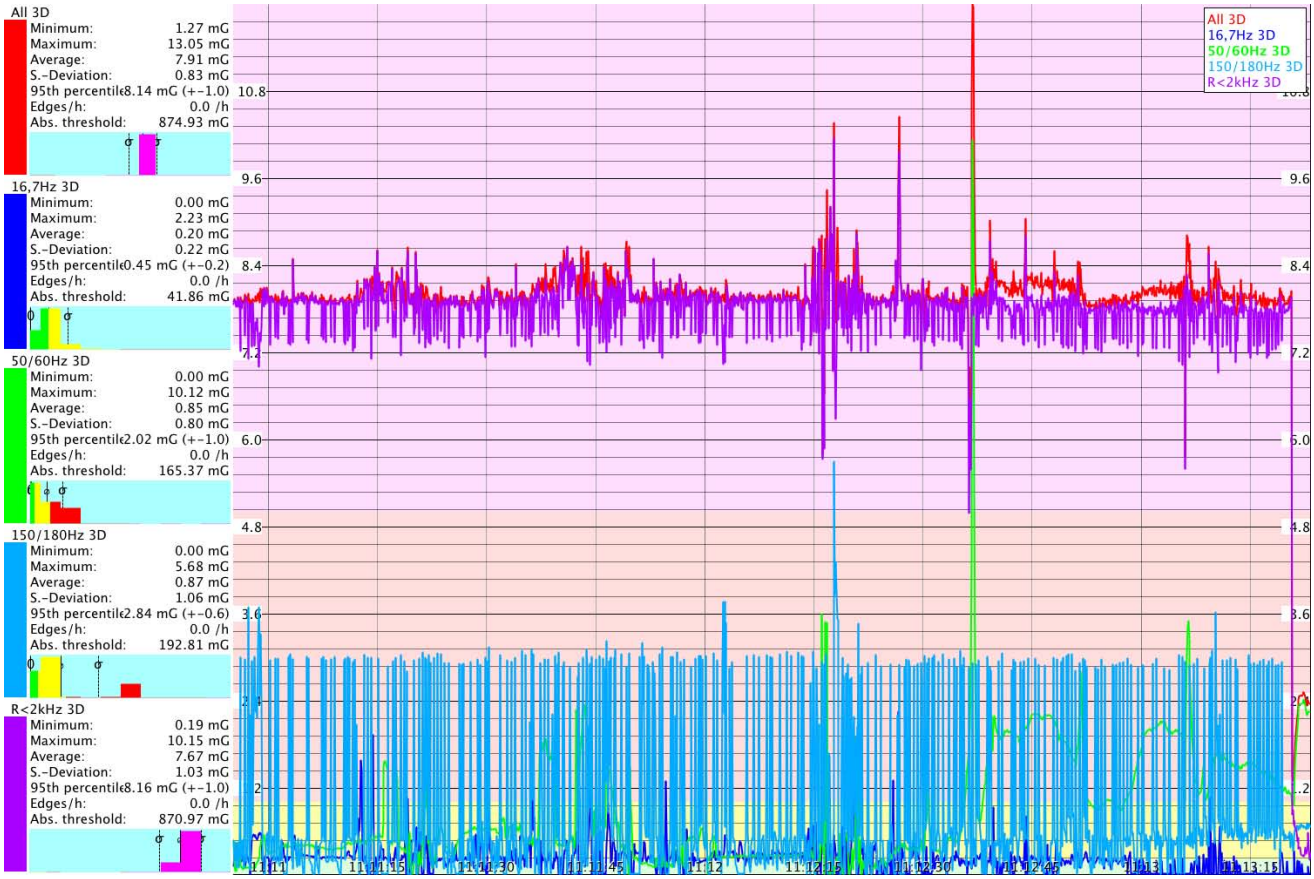
The relationship between the various frequency components observed in the floor measurement above has shifted. The component <2000 Hz is no longer the predominant field but has decreased to be more in line with the other components– 16.7, 60, 150 and 180 Hz.



Tesla Passenger's Side Floor

The total and <2000 Hz looks similar to the driver's side, however, the 150, 180 Hz components spikes are more robust, peaking at 5 to 6 mG. compared to the drivers side at about 0.4 mG.

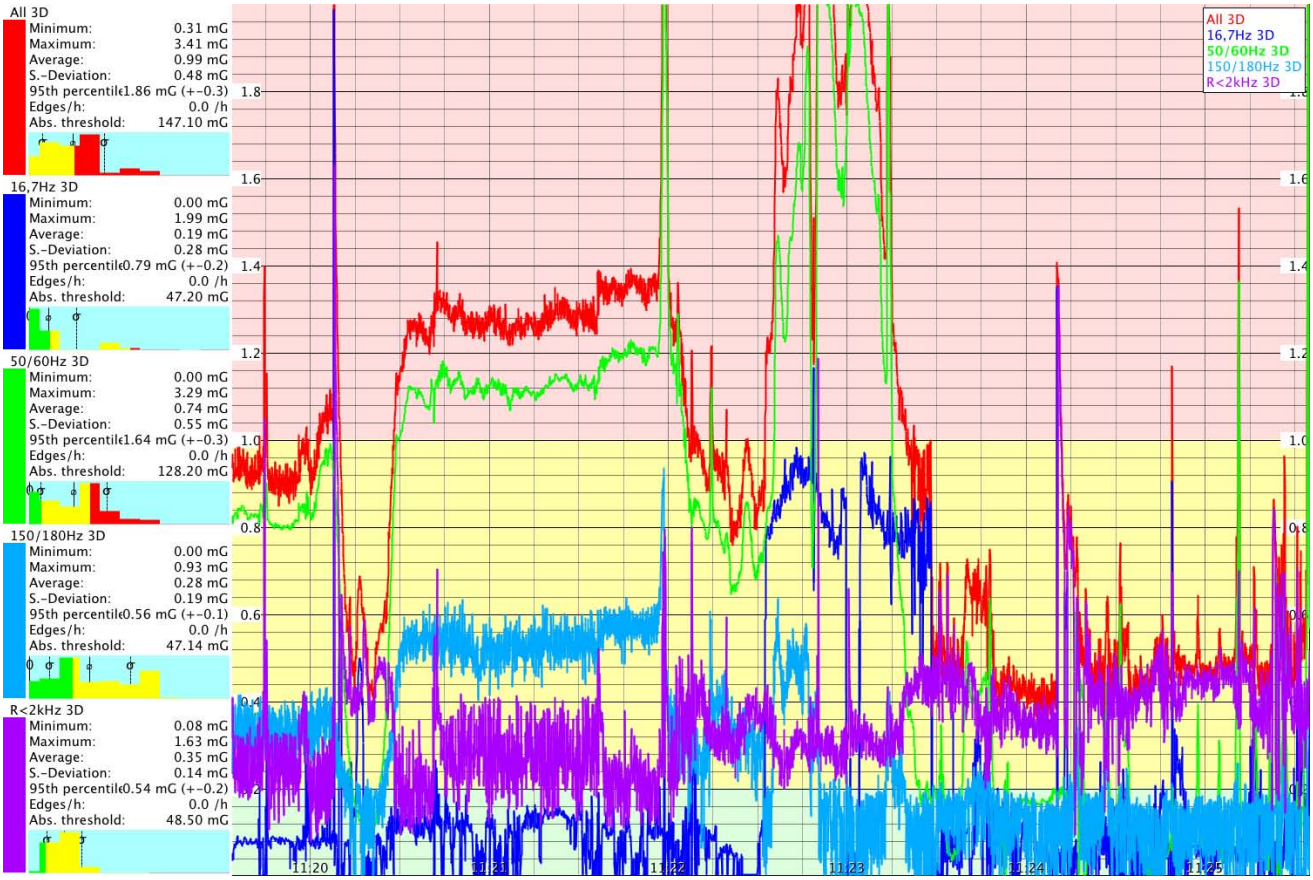
The total field average (red) is about 8 milliGauss (mG) with peaks to 13 mG (off scale). The predominant component remains <2000 Hz. There is virtually no field component from >2000 Hz.



Tesla Passenger's Lap

The overall character of the magnetic fields if different than at the passenger floor or for the driver's side floor or seat. It is much more disturbed than at the other points measured.

The total field average (red) is about 1 milliGauss (mG) with peaks to 3 mG (off scale), about double the driver's side. The predominant component has shifted to 50, 60 Hz (green). The <2000 Hz component has dropped to an average of 0.3 mG and a maximum of 1.6 mG. The characteristics of the magnetic field here are different compared to the floor suggesting magnetic fields originating in the dashboard are more influential.

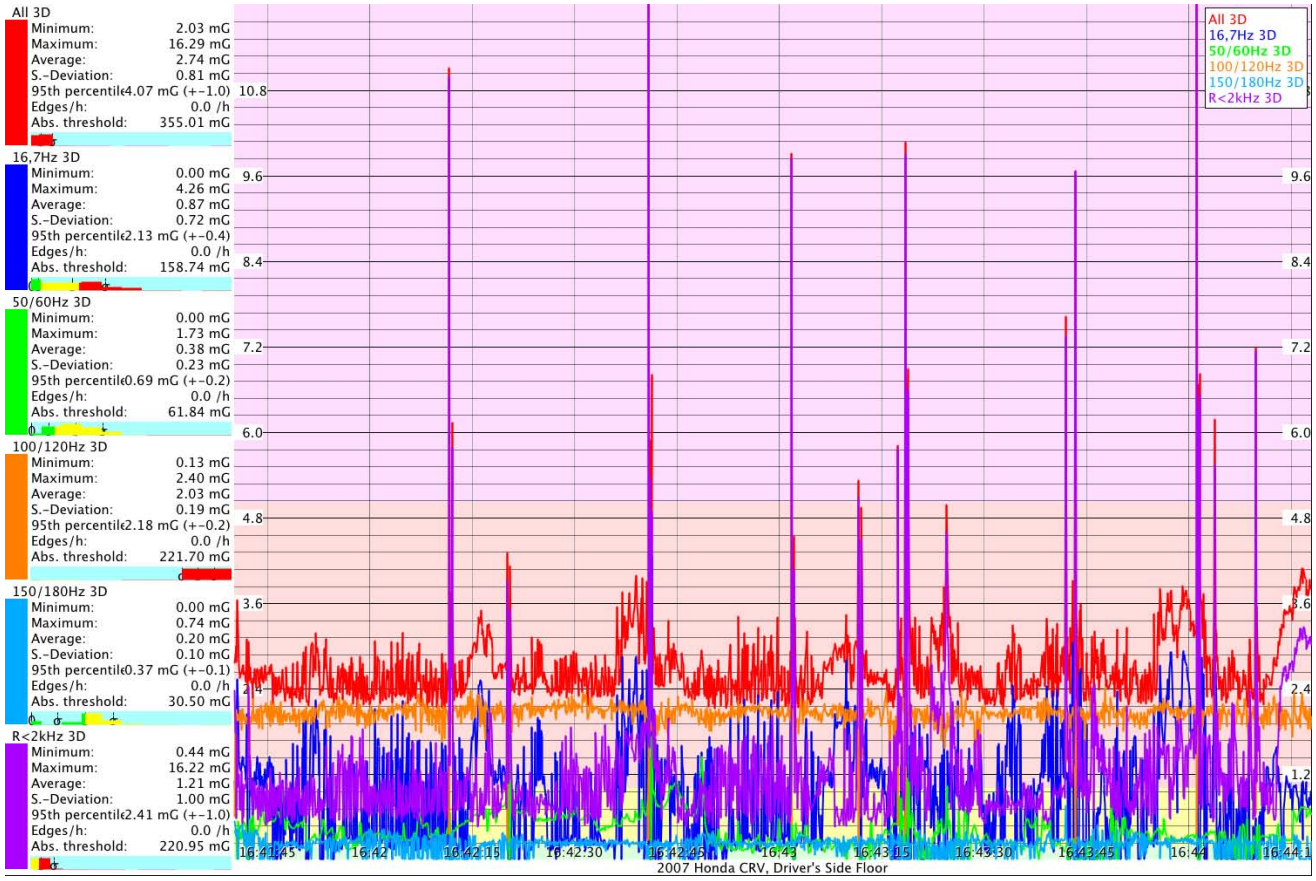


Honda CRV Driver's Floor

The total field average (red) is about 2.7 milliGauss (mG) with peaks to 16 mG (off scale). The total average level in the Honda are about 1/3rd of the Tesla, but the Honda magnetic field spikes are higher, 16 versus 11 mG. While, the <2000 Hz (purple) average component is much less pronounced compared to the Tesla, the spikes are much more pronounced.

The predominant frequency is 100/120 Hz (orange) compared to <2000 Hz for the Tesla. The Tesla did not have a 100/120 Hz component.

In any case, the components are pretty close together here compared to the high level of <2000 Hz in the Tesla.



Honda CRV Driver's Lap

This appears to be a reduced version of what was seen on the Honda floor shown on the prior page. However, the Honda total field at the seat averaged 1 mG with a maximum of 4.4 mG. This is about double the Tesla which averaged 0.5 mG with a maximum of 1.7 mG.