CLAIMS

1. Drive circuitry for a fuel injector actuator, said drive circuitry including a High Side Drive portion and a Low Side Drive portion, and including determination means to determine a short condition, said determination means adapted to perform a frequency analysis of a voltage(s) or a voltage signal at, or from, one or more points in the High Side Drive, and to determine if a faulty short conditions exists based on said analysis, wherein said voltage is the voltage of the High Side Drive Enable Signal.

2. Drive circuitry as claimed in claim 1 where said voltage is the voltage at the high side connection terminal for the fuel injector actuator.

~~3. Drive circuitry as claimed in claim 1 or 2 where said voltage is the voltage of the High Side Drive Enable Signal.~~

34. Drive circuitry as claimed in claims 1 to 2~~3~~ where said determination means is adapted to perform the frequency analysis of a voltage(s) by being adapted to compare the frequency of the voltage with a stored value, and output a signal indicative of a faulty short condition dependent on said comparison.

45. Drive circuitry as claimed in claim ~~4~~3 said determination means is adapted to determine that a short condition exists if said voltage frequency is higher than said stored value, or higher than the stored value plus a tolerance threshold~~.~~.

56. Drive circuitry as claimed in claim ~~5~~4 wherein said stored value and/or tolerance threshold is variable and/or programmable.

6.~~7~~ Drive circuitry as claimed in claim 5~~6~~ wherein said stored value and/or tolerance threshold is variable and/or programmable and set according to operating conditions of the injector or type of fuel injector and/or fuel injector actuator.

7~~8~~. Drive circuitry as claimed in claims 4~~5~~ to 6~~7~~ where the stored frequency value is the operational switching frequency measured at an earlier time-point~~.~~.

8~~9~~. Drive circuitry as claimed adapted to stop the high side drive switching if a fault condition is determined.

9.~~10~~ A method of determining a short~~-~~ condition in drive circuitry for a fuel injector actuator, said drive circuitry including a High Side Drive portion and a Low Side Drive Portion, comprising performing a frequency analysis of a voltage(s) or a voltage signal at, or from, one or more points in the High Side Drive; and, determining if a faulty short conditions exists based on said analysis, wherein said voltage is the voltage of the High Side Drive Enable Signal.~~.~~

10~~1~~. A method as claimed in claim ~~10~~ 9 where said voltage is the voltage at the high side connection terminal for the fuel injector actuator.

~~12. A method as claimed in claims 10 or 11 where said voltage is the voltage of the High Side Drive Enable Signal.~~

11~~3~~. A method as claimed in claims ~~10~~ 9 to ~~12~~ 11 comprising;

a) comparing the frequency of the voltage with a stored value, and determining a short condition dependent on said comparison.

~~14~~12. A method as claimed in claim ~~13~~ 11 where step a) comprises determining if said frequency is higher than said stored value, or higher than the stored value plus a tolerance threshold..

~~15~~13. A method as claimed in claim ~~14~~ 12 wherein said stored value and/or tolerance threshold is variable and/or programmable.

~~16~~14. A method as claimed in claim ~~15~~ 13 wherein said stored value and/or tolerance threshold is variable and/or programmable and set according to operating conditions of the injector or type of fuel injector and/or fuel injector actuator.

~~17~~15. A method as claimed in claim ~~14~~ 12 to ~~16~~ 14 where the stored frequency value is the operational switching frequency measured at an earlier time-point.

~~18~~16. A method as claimed in claim ~~17~~ 15 including stopping the high side drive switching if a fault condition is determined.