# **ECD** Control frequency requirements

## TENTATIVE REQUIREMENTS

The DDS frequency generator main task is that to provide 3 independent square wave signals able to correctly drive the power MOSFETs 'Driver' subsystem. There should be a master Xtal controlled oscillator and programmable divider chain and/or a direct digital synthesizer approach.

## **3 Fequencies**

### Asynchronous mode

The DDS should provide 3 programmable and simultaneous asynchronous frequencies in the ranges:

- 1. 1 10 KHz with sep of 1 Hz
- 2. 10 100 KHz with step of 1 Hz
- 3. 100 500 KHz with step of 1 Hz

The signal output provided should be normally a 50% duty cycle square wave with the possibility to reach an 1% duty cycle.

The signal output level is important so should be provided onto the PCB 3 separate ten turn trimmer to set it for best UCC3724 operation.

### Synchronous mode

It would be necessary to include as well the possibility to include a 'Synched' output. This means that the transition timing on the 3 waveforms should be in the same time. What is important in this case is that for testing purposes it is necessary to:

Have the possibility to program at once the 3 frequency you want, the frequencies itself must conform to the following table in order to have as output an automatic rotating field with 120degrees spacing. This can be done by allowing the division ratio to choose i.e. :3, :7, :49 or other ternary values. It is clear that said ratios refer to harmonics. So if Finput is known than F1 = Finput x 3, F2=Finput x 7, F3 =. Finput x 49. In our case we would have, if Finput were set to 1000 Hz → 3000Hz, 21000Hz and 49000Hz.

Safety requirements

In my opinion it would be necessary incorporate in software the following control:

• Allow the introduction by dip switch of a code that is the % of conversion that one want to obtain

It should run as this: every time the software does synthesize a ternary frequencies, before outputting them, it pass them to a safety control that compare the 3 frequency value with the 3 freq for full conversion. If the requested output is within a percent value (assigned by the user with dip switch also) OK the controller is allowed to deliver the requested 3 freq. On the contrary it for example just light a Led.