LMX2594 Combining MASH_SEED and SYNC

The SYNC feature allows the user to get deterministic phase relationship between OSCin and Fout for the LMX2594. The MASH_SEED allows the user to adjust this phase. So if both are combined, as many users want to do, one can sync two devices and tune out this phase with MASH_SEED. However, it turns out that there are restrictions to using both of these features together. Here are the key restrictions:

1. If using the 1st Order modulator with a non-zero fraction, your phases are limited. You only get CHDIV/IncludedDivide Phases. For instance, if CHDIV=8, then IncludedDivide=4 and you only get 2 phases
2. If using the 2nd order modulator below 9 GHz (for CHDIV=4) or 10 GHz (for CHDIV=6), there are cases that don't work. Lowering the N value sometimes helps, but not always. Manual verification is needed. At higher frequencies, Above this, there might be some less stringent restrictions based on minimum N divider value, but it can be made to always work.

Start

IncludedDivide>1 ?

Yes → Use any Order. No Restrictions or Issues

No

Fnum>0

Are you OK with only CHDIV/IncludedDivide Phases?

Yes → 1st Order Modulator — No Restrictions Best for Spurs

No

Can you demonstrate with measurements case is monotonic with 2nd Order Modulator?

No → Can you change Fpd or CHDIV to create a fraction

Yes →

No → Change OSCin to create a fraction

Yes → 2nd Order Modulator

Fnum>0 → Yes → Does simplified fraction have Fden<=6 and Fnum>0 ?

Yes → 1st Order Modulator — No Restrictions Best for Spurs

Spurs acceptable anyways with 1st order modulator?

Yes → 1st Order Modulator — Maybe better spurs are possible

Fvco>9 GHz (IncludedDivide=4) Or Fvco>=10 GHz (IncludedDivide=6)

Yes → 2nd Order Modulator — Maybe might requiring lower Fpd, but will work

Can you demonstrate with measurements case is monotonic with 2nd Order Modulator?

Yes → 2nd Order Modulator — Maybe might requiring lower Fpd, but will work

1st Order Modulator — Will work, but higher spurs than wanted