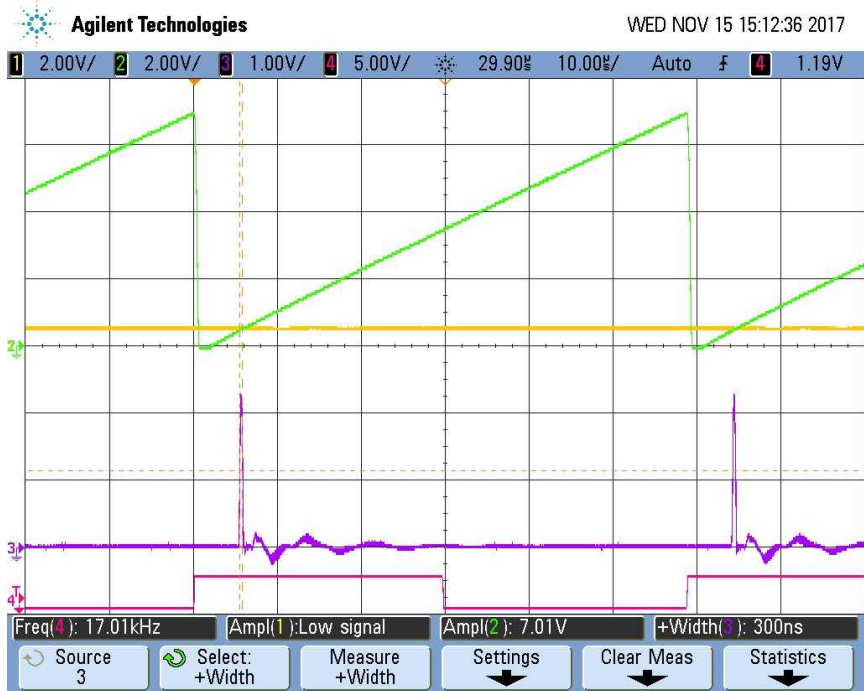
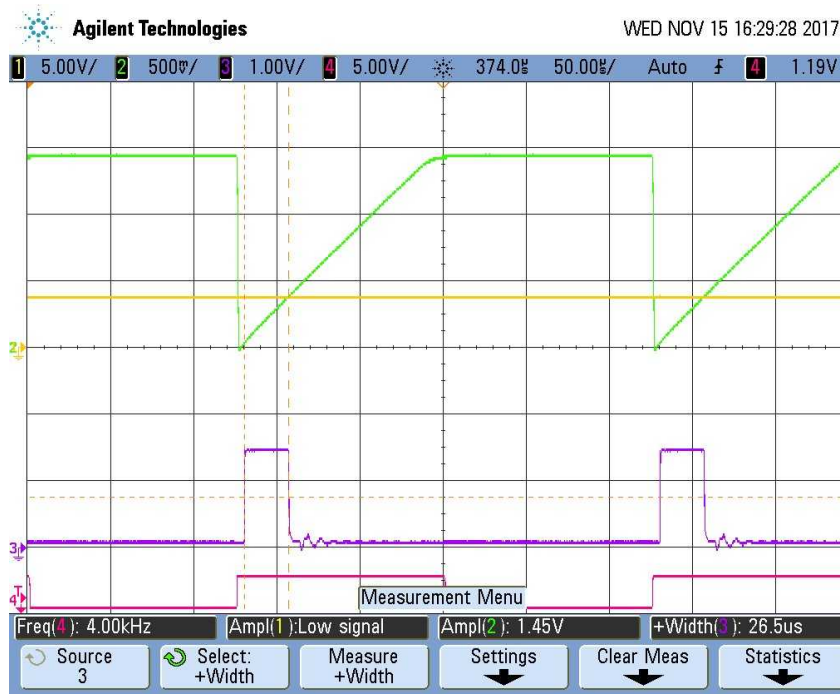
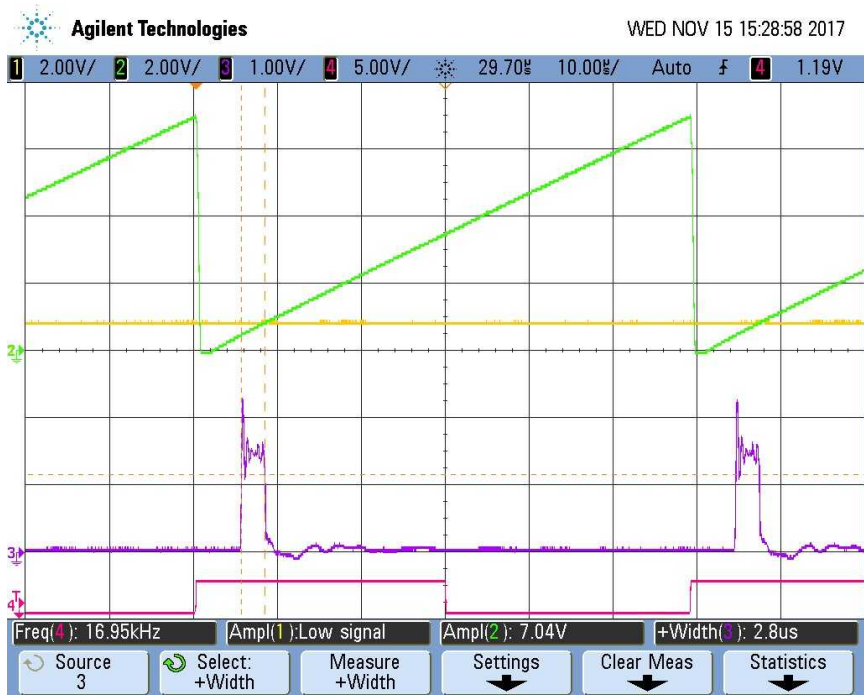


# CESR Quadrupoles at Low Currents

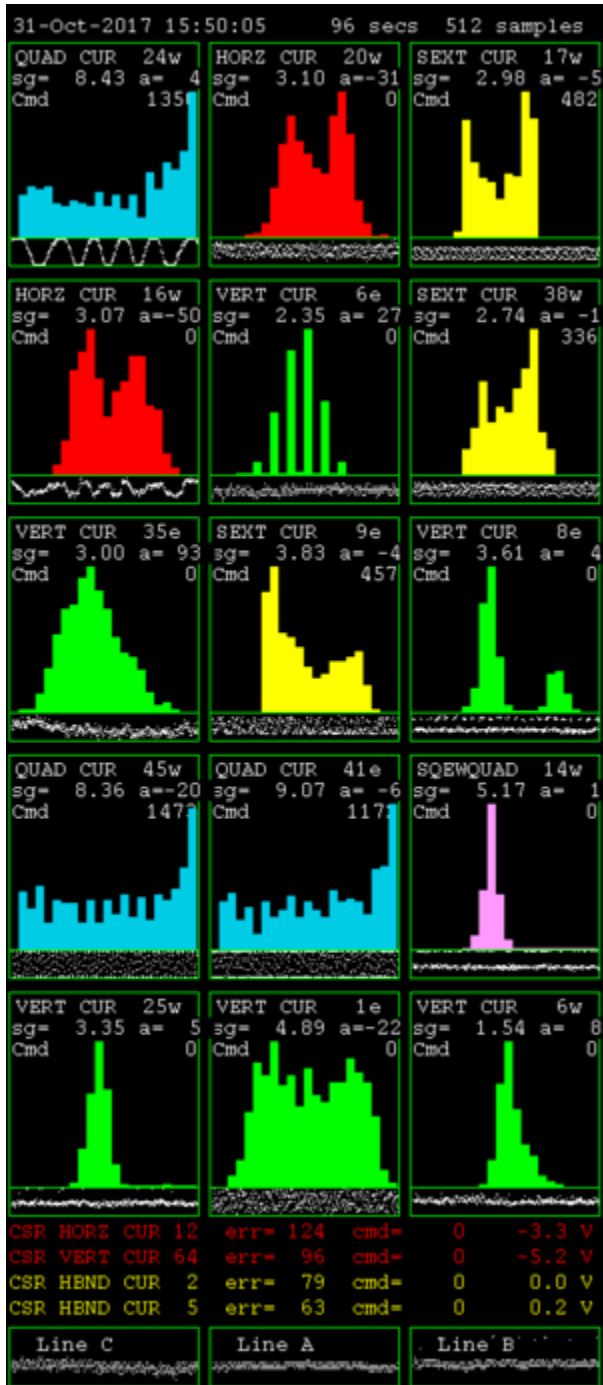
- Scope Traces
  - Duty cycle at low command 1kcu
  - Compare 17kHz to 4kHz at 10kcu
- Histograms
  - OSC save set
  - 500cu quads cesr east
- Quadrupole 33E performance at 4kHz and 17kHz chopper clock frequencies.
- Conclusion



- Normal chopping frequency (17kHz)
- Low Command (1000cu)
- At even lower commands, “on time pulses” (purple) get smaller and smaller with more uncertainty.
- Control gets compromised
- Stability most likely effected
- No longer viable

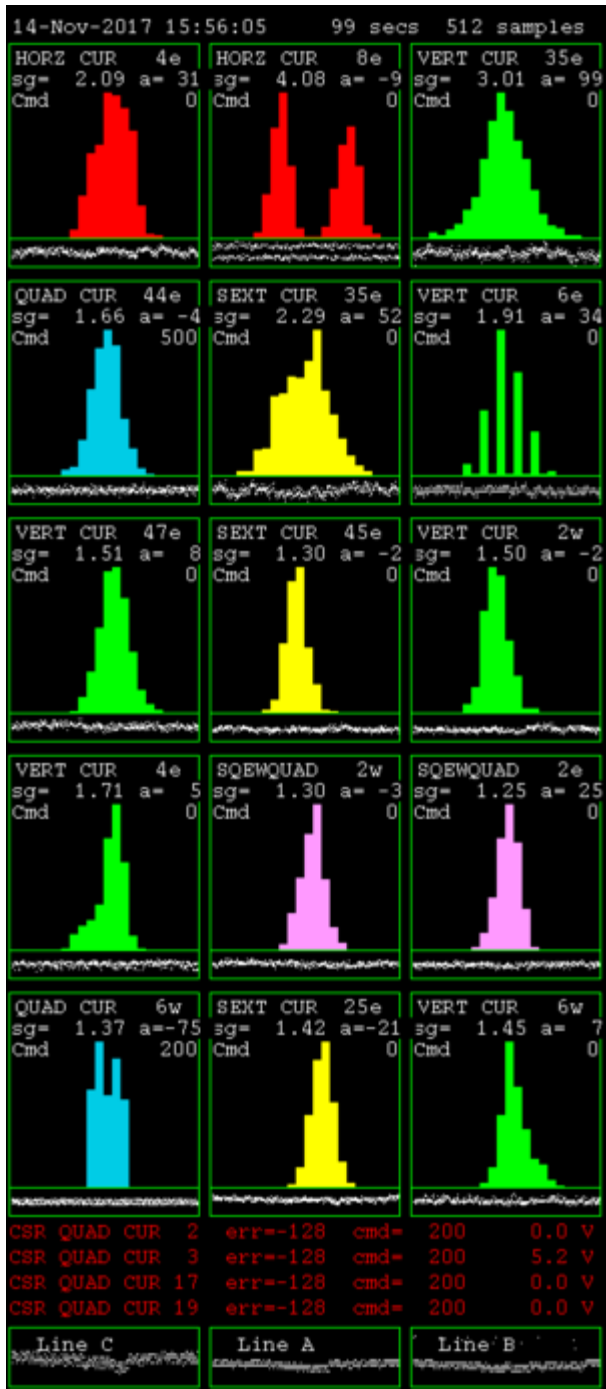


- Compare cmd of 10kcu at 17kHz and 4kHz
- “on time” pulses from 3uS to 25uS
- Notice scope at 10uS and 50uS/div
- Huge difference in chopper “on time”
- This is the advantage to lower frequency.



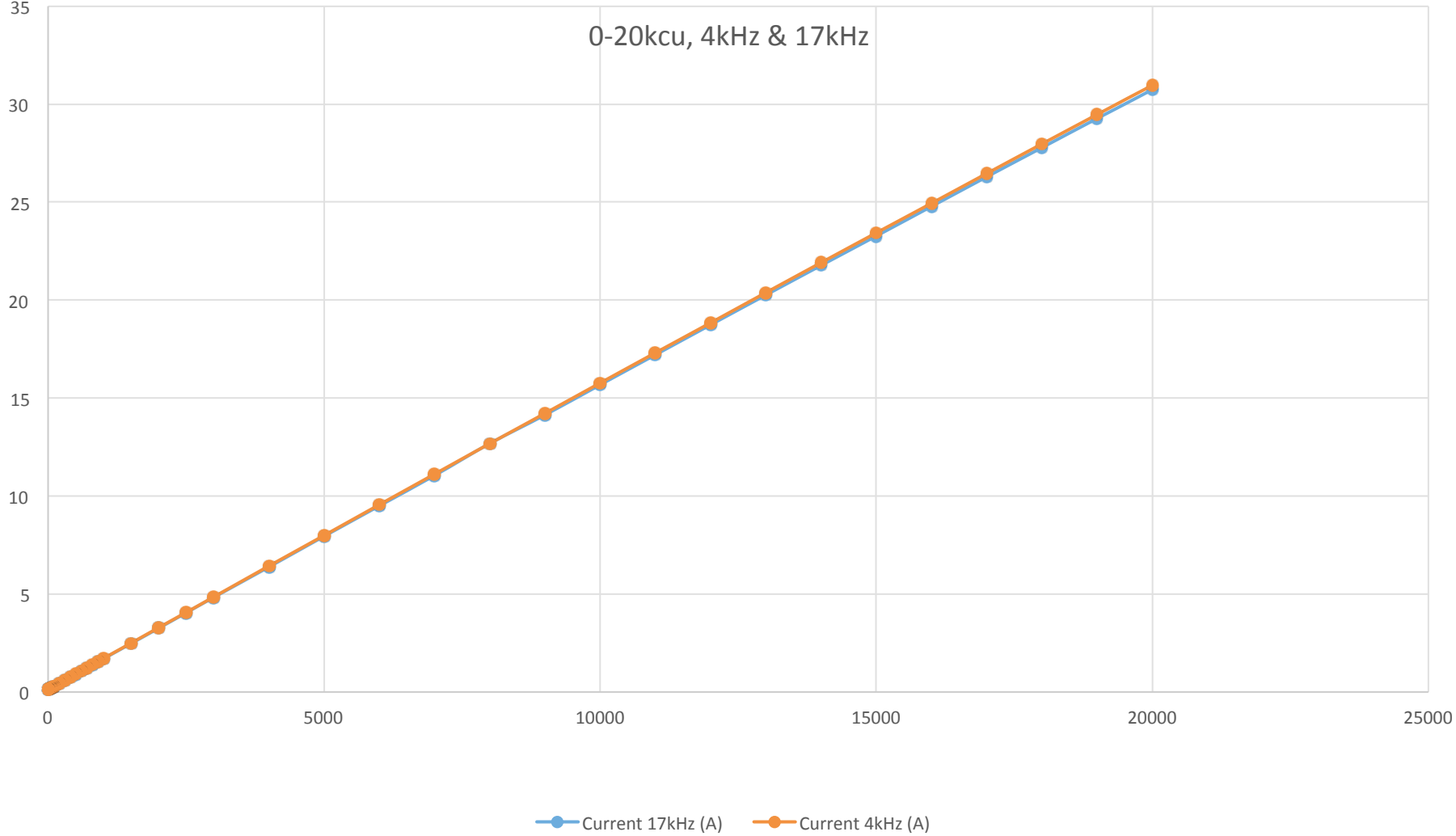
## Regulation Histograms for CESR magnets

- Magnet error monitor program.
- This program looks at all cesr magnets and displays the “worst” case regulation in all magnet types.
- Blue/quads, Red/horizontal, Green/vertical, Yellow/sextupole, Pink/skew.
- Conditions here are from OSC save set, first try from couple weeks ago.
- For now, only pay attention to the Blue images. Quadrupoles at normal Chopping frequency of 17kHz
- Q24W, Q45W, Q41E
- Commands are 1350cu, 1470cu, 1170cu (1.5 to 2Amps)
- Typical commands for CHSS (5.3gev) 20kcu (approx. 30Amps)
- So commands of many kcu are far enough away from the trouble area that they are just not a problem



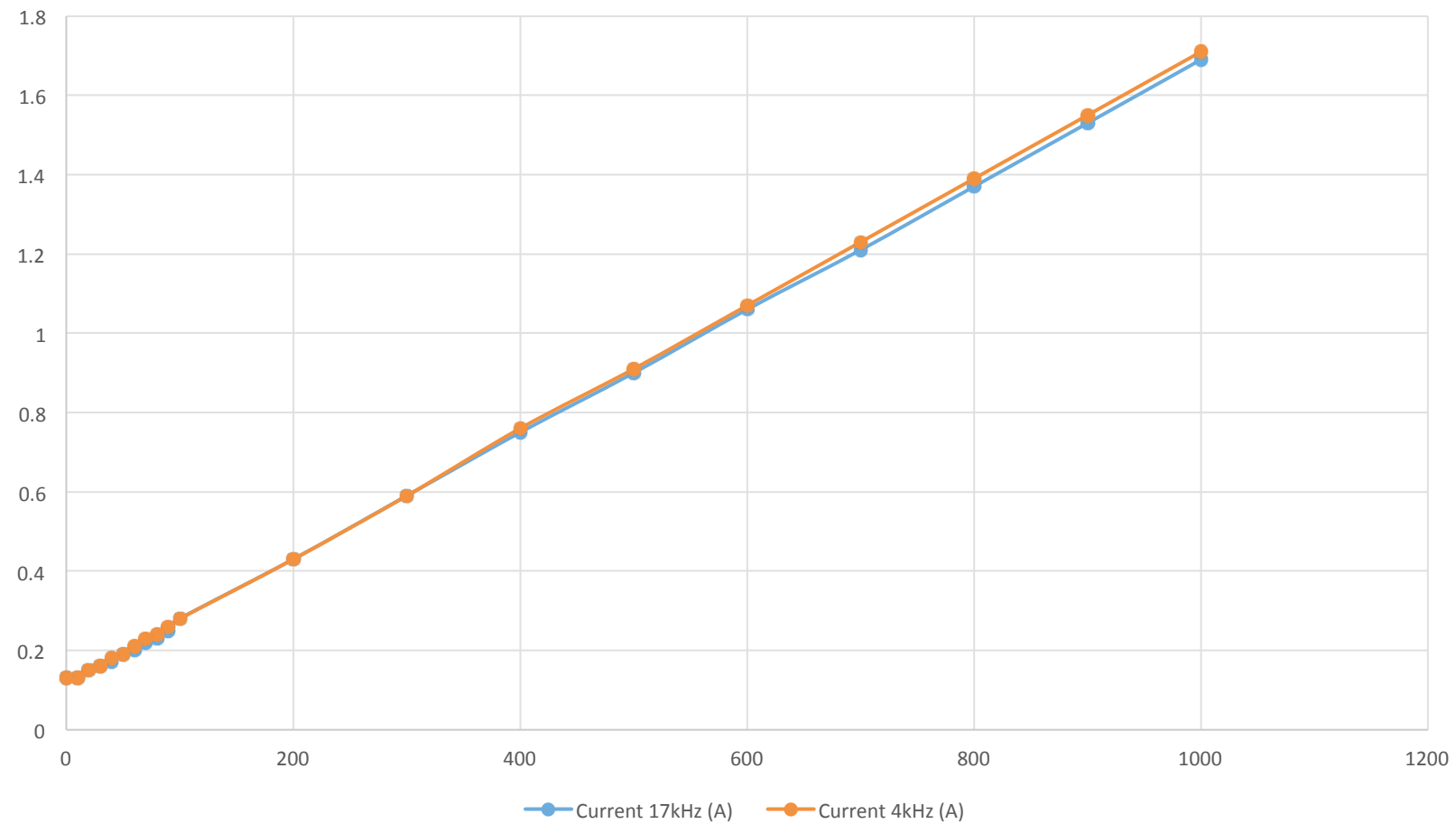
- From this past Tuesday
- Ran east Qbus only, Quads only.
- 500cu command (lower than the lowest OSC)
- 4kHz chopping frequency
- Worst of the East is Q44E
- It's histogram looks completely normal.
- This says that the rest of the quads in the east are as normal or better.

# CESR Quadrupole 33E



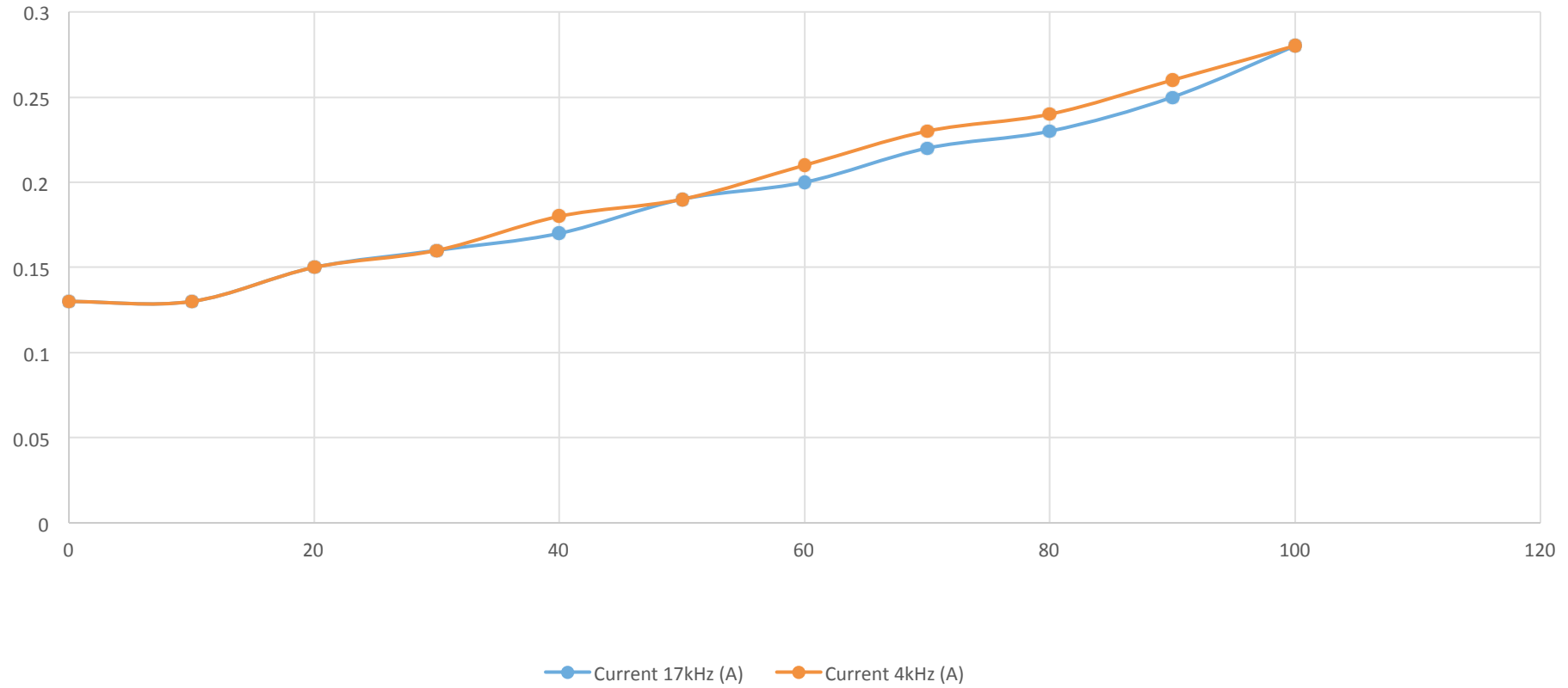
# CESR Quadrupole 33E

0-1kcu, 4kHz & 17kHz



# CESR Quadrupole 33E

0-100cu, 4kHz & 17kHz



## Conclusion:

- Need to do another test.
- Therefore need more global diagnostics for full ring test.
- At this point, the belief is that steering type ps's are very good to zero command (they will be checked with the next test).
- Higher current ripple with lower chopper clock.
- Although may not be an issue from a field point of view.
- 4kHz is well within audible range (more wear and tear?). Depending on current, you can really hear it.